Health and Physical Education

Grade 11

Educational Publications Department



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The National Anthem of Sri Lanka

Sri Lanka Matha
Apa Sri Lanka Namo Namo Namo Namo Matha
Sundara siri barinee, surendi athi sobamana Lanka
Dhanya dhanaya neka mal palaturu piri jaya bhoomiya ramya
Apa hata sepa siri setha sadana jeewanaye matha
Piliganu mena apa bhakthi pooja Namo Namo Matha
Apa Sri Lanka Namo Namo Namo Namo Matha
Oba we apa vidya
Obamaya apa sathya
Oba we apa shakthi
Apa hada thula bhakthi
Oba apa aloke
Apage anuprane
Oba apa jeevana we
Apa mukthiya oba we
Nava jeevana demine, nithina apa pubudukaran matha
Gnana veerya vadawamina regena yanu mana jaya bhoomi kara
Eka mavakage daru kela bevina
Yamu yamu vee nopama
Prema vada sema bheda durerada
Namo, Namo Matha
Apa Sri Lanka Namo Namo Namo Namo Matha

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Being innovative, changing with right knowledge
Be a light to the country as well as to the world.

Message from the Hon. Minister of Education

The past two decades have been significant in the world history due to changes that took place in technology. The present students face a lot of new challenges along with the rapid development of Information Technology, communication and other related fields. The manner of career opportunities are liable to change specifically in the near future. In such an environment, with a new technological and intellectual society, thousands of innovative career opportunities would be created. To win those challenges, it is the responsibility of Sri Lankan Government and myself, as the Minister of Education, to empower you all.

This book is a product of free education. Your aim must be to use this book properly and acquire the necessary knowledge out of it. The government in turn is able to provide free textbooks to you, as a result of the commitment and labour of your parents and elders.

Since we have understood that the education is crucial in deciding the future of a country, the government has taken steps to change curriculum to suit the rapid changes of the technological world. Hence, you have to dedicate yourselves to become productive citizens. I believe that the knowledge this book provides will suffice your aim.

It is your duty to give a proper value to the money spent by the government on your education. Also you should understand that education determines your future. Make sure that you reach the optimum social stratum through education.

I congratulate you to enjoy the benefits of free education and bloom as an honoured citizen who takes the name of Sri Lanka to the world.

Akila Viraj Kariyawasam
Minister of Education

Foreword

The educational objectives of the contemporary world are becoming more complex along with the economic, social, cultural and technological development. The learning and teaching process too is changing in relation to human experiences, technological differences, research and new indices. Therefore, it is required to produce the textbook by including subject related information according to the objectives in the syllabus in order to maintain the teaching process by organizing learning experiences that suit to the learner needs. The textbook is not merely a learning tool for the learner. It is a blessing that contributes to obtain a higher education along with a development of conduct and attitudes, to develop values and to obtain learning experiences.

The government in its realization of the concept of free education has offered you all the textbooks from grades 1-11. I would like to remind you that you should make the maximum use of these textbooks and protect them well. I sincerely hope that this textbook would assist you to obtain the expertise to become a virtuous citizen with a complete personality who would be a valuable asset to the country.

I would like to bestow my sincere thanks on the members of the editorial and writer boards as well as on the staff of the Educational Publications Department who have strived to offer this textbook to you.

W. M. Jayantha Wickramanayaka,
Commissioner General of Educational Publications,
Educational Publications Department,
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2019.04.10

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Message from the Editors

This textbook that has been written under the new syllabus to be effective from year 2015 has been designed with a view to imparting knowledge, fostering attitudes and enhancing skills that are necessary for shaping physical, mental, social and spiritual development and for facilitating the creation of the environment required for healthy living through the study of the subject of Health and Physical Education.

The adolescent children who have come to Grade 11 armed with the knowledge gained by studying the subject of Health and Physical Education from Grades 6 to 10 will become adults in a few years' time. Therefore, beyond providing health education to the pupils, the need for empowering them with self skills for the promotion of health and the path that should be taken in order to achieve that purpose has also been shown through this book, and thus they are expected to contribute towards promoting the health of their families and their communities as well as that of their own.

The subject matter contained in this book related to health has been sourced from the World Health Organization (WHO) while the facts related to physical education are in accordance with the principles, theories and the activities related to physical education and are based on the handbooks on sports published by national and international associations. The facts coming under "For extra knowledge", which have been included with the objective of enhancing the knowledge of the pupils are considered important to them in addition to those that are contained in the syllabus. By doing the exercises given at the end of each lesson, the pupils can engage themselves in a self evaluation in order to ascertain whether they have properly grasped the facts given through the lesson. Practical skills of the pupils will be enhanced by doing the activities given in this book under the directions of the teachers.

The chapters in this textbook have been lined up following the lesson sequence that has been recomended by the National Institute of Education. Therefore the pupils will get the opportunity in the class to learn these lessons in the same order.

Since Health and Physical Education is a practical subject, it is very important that the facts contained in this book are adopted in day-to-day life. Apart from that, it is also expected that the content of this book be used to shape the life of the pupils without considering it to be merely an examination oriented tool. Especially, the knowledge about sports and physical activities contained in this book should be practised and experienced outdoors rather than learning by heart, for theoretical knowledge will be complete only if it is also experienced practically.

Our sincere wish is that this book will contribute in creating an active and healthy generation so that the outcome of our collective effort is achieved.

Board of Editors

Contents

1 Let us build a healthy society

School health programmes in Sri Lanka are implemented with the vision of building a "healthy and active young generation". The main objective of these programmes is to obtain the maximum benefit from academic opportunities to improve the health status of school children and develop skills in personal, family and community health promotion. The school health promotion programmes also help to build a healthy environment within schools, carry out immunization programmes, detect unidentified illnesses and impart health education to families.

You have studied the different areas of health promotion in the previous years and are now well aware of the concept of total health and the factors that affect it, as well as what steps need to be taken to maintain it.

In this lesson we will focus on learning about health promotion and quality of life.

Health Promotion

The World Health Organization definition of health promotion is as follows.

> Health promotion is the process of enabling people to increase control over, and to improve their health. It moves beyond a focus on individual behaviour towards a wide range of social and environmental interventions.

What is clear from the above definition is that promotion of health is not something that is limited to the behaviours of a single individual, but it is a broader concept that requires the involvement of the entire society. It is only by empowering yourself as a person who has the capability to control and improve the factors that affect your health and that of your family and the society that promotion of health can be made a reality.

Strategies of Health promotion

Diagram 1.1 - Methods of health promotion



Centres of health promotion

Health promotion can be carried out in various settings. Just as we can make our home a health promoting centre, the school, village, city, hospital and work places can be converted to health promoting centres.

The common strategies of health promotion, which can be utilized in any of these settings, are shown in diagram 1.1. They can be used for health promotion in your school as well.

Actions to develop school health promotion

1. Formulation of health promotion policies

The development of pro health policies can create an environment, favourable to the promotion of health within the entire school system. In formulating a health policy the first step is to identify the current health issues the school is faced with and means of eliminating or reducing these factors. Once the policy is formulated the laws and circulars required to implement the policy are made.

As students you have a great responsibility to make school health promotion policies and work according to them at school level.

eg: Policies for waste management

Some school health promotion policies are listed below

- Students should be provided with adequate knowledge on health
- Clean drinking water should be made available within schools
- Schools must have hygienic canteens
- The school environment should be accident free
- Students who are aged 12 years and below, should be provided with school dental services
- School books should be printed with different font sizes and colours as appropriate for each age group
- The type and the appropriate height of desks and chairs, should be determined for each age group



Figure 1.1 - Providing healthy food

If we are to build a healthy environment through such policies all stakeholders including education authorities, principals, teachers, parents and students should be aware of theses policies and they must be in agreement with them.

2. Building an environment favourable for health promotion

The environment, which we live in has an impact on our health. Listed below are some of the factors that should be present in our physical, mental and social environment to promote health.

Physical environment

- Provision of clean drinking water
- Provision of adequate toilet facilities - at least one toilet per 50 students
- Building class rooms with adequate light and ventilation
- Proper disposal of waste - for this purpose methods of waste management should be introduced
- School gardening
- Accident and danger free environment
- Provision of adequate facilities for sports



Class room with adequate space



Facilities to engage in sport activities

Figure 1.2

Mental environment

- Students should not be insulted
- There should not be any form of abuse
- All students should be treated equally
- Counselling services should be established so that students can discuss their difficulties
- The school environment should be free of stress



Counselling Services

Figure 1.3

Social environment

- Safeguard democracy
- Availability of space for group activities
- Healthy student teacher relationships
- Availability of programmes to spend leisure time in a useful manner
- The presence of clubs and associations for different activities
- Providing opportunities for sports activities



Figure 1.4 - Cordial student teacher relationship

3. **Community participation in health promotion**

The school health promotion programmes give rise to health promotion in the community as well. For example, parents and other members of the community assist in the dengue eradication campaign carried out by the school. As a result of this, their awareness and interest in dengue eradication may be increased and therefore they may carry out similar programmes in other places in the community.

Similarly community participation should be enlisted for school health promotion. For example, shramadana campaigns by members of the community to minimize accidents that can occur in school premises, constructing a sports ground for the school and reducing cigarette sales outlets around the school to prevent school children from being introduced to smoking, are some of the ways in which the community can aid school health promotion.



Figure 1.5 - Conducting community cleaning programmes

4. Developing skills required for health promotion

This involves improving skills to develop health promoting behaviour.

eg:

Good decision making – selecting healthy food from what is available in the market

Effective communication – the ability to understand what is implied in advertisements correctly

To improve the health status of a school, workplace or village some behavioural modifications are required. Developing skills such as consuming healthy meals, following an active lifestyle and being able to face and manage life stresses successfully are essential for health promotion. Skills can be developed by providing knowledge through books and educational workshops, group competitions, debates and sports competitions.



Figure 1.6 - Providing health education through work shops

5. Provision of required services for health promotion

The government carries out school health inspections to improve the health status of school children. All students must undergo school health inspections during specified periods so that any health deficiencies can be identified and corrected. They are also provided with iron and folic acid tablets. The Public Health Inspector (PHI) carries out an annual School Sanitation Survey through which areas that can give rise to illness or accidents are identified and measures taken to prevent them.



Figure 1.7 - Annual school sanitation survey

In addition, if there are any shortcomings in these services correcting them and making them more efficient, as well as implementing new services for newly identified needs are other methods of health promotion.



Figure 1.8 - Providing adequate sanitary facilities

Activity

Study the school health promotion programme 2007/21 circular issued by the Ministry of Education with the assistance of your health teacher. Gather the following information about your school according to the circular.

- The school health promotion committee and its activities
- The status of the school sanitation facilities
- The hygienic status of the school cafeteria and provision of healthy food
- Implementation of the morning physical exercise programme
- Assessment of physical fitness of students

Using the above information evaluate your school and identify the health promotion status of your school. Discuss what steps need to be taken to improve it further.

Criteria for school health promotion evaluation

In order to improve health promotion activities in schools, an initial evaluation of the school's health promotion status could be done using a set of criteria.

Stated below are several criteria that can be used to evaluate the success of each of the above methods.

- The school accepting the need to follow established health policies
- Recognition of health policies that can be carried out by the school
- Identifying methods of carrying out these health policies

Above criteria are included in the school health promotion circular of Ministry of Education.

Activity

Discuss methods of improving the level of health promotion in your school and complete the table given below.

Method	Current status	The way in which it should be changed	The steps that can be taken
1. Health policies • Waste management policies • Policies for hygienic cafeterias			
2. Health friendly environment • Availability of adequate toilet facilities • Availability of a sports ground			
3. Community participation • Carrying out shramadana campaigns • Organizing dengue eradication programmes			
4. Knowledge and skills development • Identifying your own nutritional status • Identifying your level of physical fitness			
5. Organization of health services • Learning about reproductive health • Obtaining immunization			

Laws pertaining to school health promotion in Sri Lanka

1. Compulsory health education from grade 6 to grade 9 (according to the syllabus)
2. Compulsory provision of health facilities

   Facts regarding provision of health facilities

   - Ensure that the well is protected
   - Provide one toilet per 50 students
   - Create an accident free school environment
   - Carry out dengue eradication programmes
3. Prohibit the consumption or sale of unhealthy food
4. Prohibit the possession or use of cigarettes, alcohol and drugs



Figure 1.9 - Health facilities

Activity

Make a list of health promotion measures carried out at the National level.

Quality of life

Quality of life is the general well being of a person. Improved quality of life leads to increase in longevity, reduction in disease and infirmity and a happy and active life.



Figure 1.10

Factors that affect the quality of life

There are many factors that affect the quality of life. A few of them are listed below.

- Health status
- Economic status
- A clean environment
- Opportunity to receive an education
- Opportunity to engage in suitable employment
- A good family life

Activity

Discuss other factors that affect the quality of life which are not mentioned above.

An individual's health is a major determinant of his quality of life. As we have learned earlier, total health is not merely the absence of disease or infirmity, but the presence of physical, mental, social and spiritual well being. Contracting communicable and non-communicable diseases can reduce the quality of life. Therefore quality of life can be improved by improving resilience towards illness by vaccination and good health practices

The improvement in quality of life due to improvement in the health status can be measured by the following features.

Features of a community with a high quality of life



Figure 1.11

- Efficiency in doing work
- Increased life expectancy (Sri Lankan males 73 years; females 76 years) *
- Reduced prevalence of non-communicable diseases
- Following a healthy diet

* Annual Health Bulletin 2012

- Exercising in the correct manner and being able to control psychological stress
- Abstaining from cigarettes, alcohol and illicit drugs
- Acting according to principles
- Improving mental well being / being happy
- Leading a simple lifestyle
- Literacy

The health status of a community can be measured using the above criteria while other criteria can be used for evaluating the health status of an individual.

Criteria used to measure an individual's health status

- Body Mass Index (BMI)
- Waist circumference
- Physical fitness
- Memory
- Resilience towards illness
- Being active
- Pleasant appearance
- Hygiene and good habits
- Interpersonal relationships



Body Mass Index



Pleasant appearance

Figure 1.12

Summary

There are five main strategies used in health promotion. These include formulating policies, building a health promoting environment, developing community participation, developing skills and providing necessary services for health promotion.

School health promotion can be carried out using these strategies. This process includes identifying the aspects favourable to health and those unfavourable, taking necessary measures to correct these and evaluating their success by using criteria.

Many factors such as the health status, economic status, clean environment and educational status affect our quality of life. There are many criteria to evaluate the quality of life of a community as well as that of an individual.

Exercise

1. What is health promotion?
2. Name five strategies that can be used in health promotion.
3. Name five places where health promotion can be carried out.
4. Describe three health promotion policies carried out in your school.
5. Describe four features that can be seen in your school from those that are present in a health promoting school environment.
6. Name three services utilized for school health promotion.
7. Name five laws / rules that apply to your school's health promotion.
8. Explain quality of life with the use of examples.
9. Name five criteria that can be used to measure a person's quality of life.
10. Name five features seen in a community with high quality of life.

2 Let us identify stages in life after childhood

You have now passed your childhood and reached adolescence. You were conceived in your mother's womb after an ovum and a sperm were fertilized. After adolescence you will go to the stage of youth followed by middle age and finally old age. Each stage in life has different needs. When obtaining these needs we face many challenges. Knowledge about these stages will help you to function with ease and cope with people of different age groups during these stages in your life.

In grade 10 you learnt about the different needs during childhood.

In this lesson we will study the different needs, problems and challenges faced during adolescence, youth, middle age and old age.

Stages in life

Below are the stages in childhood you learnt last year.

1.	Prenatal period	- period in mother's womb
2.	Neonatal period	- from birth to 28 days
3.	Infancy	- from birth to one year
4.	Early childhood	- from one year to five years
5.	Late childhood	- from six years to 10 years

Let us learn the stages after childhood

1.	Adolescence	- 10- 19 years
2.	Youth	- 20 - 39 years
3.	Middle age	- 40 - 59 years
4.	Old age	- above 59 years

Adolescence- stage between 10 and 19 years

Adolescence is a period of transition where one is neither a child nor an adult. During this period one has to face many physical,mental and social changes.



Figure 2.1 - Adolescence

Changes during adolescence

Physical changes

- Rapid physical growth
- Emergence of secondary sexual characteristics
- Maturation of reproductive organs

Mental changes

- Quick to respond to emotions such as anger and happiness
- Creative
- Likes to be independent

Social changes

- Likes to socialize
- Interest in the opposite sex
- Enjoy the company of peers

You will have the opportunity to study more on the above in chapter 16 of this book

It is important that you learn to identify physical, social and mental changes that occur during adolescence.

Needs during adolescence

Physical needs

Nutritional needs

For growth, energy and prevention of illnesses the daily requirement of calories, micro and macro nutrients is important. Growth is rapid during this period and the proper nutrition is needed to have optimum growth and become a healthy parent later.

Exercise

To be healthy, be protected from non-communicable diseases (high blood pressure, diabetes) and be strong, you should engage in exercise.

Rest

Rest is essential to regenerate the body

Mental needs

Love

Love of parents, teachers and relations is very important especially during this period. This is the period where peer company is enjoyed. There is an interest in the opposite sex . It is difficult to differentiate between love, infatuation and emotional acts which can lead to very risky situations. Therefore you should react very intelligently during this stage.

Security

Security from parents and elders is important due to the physical and mental changes. Therefore do not hesitate to discuss your problems openly with your parents.

Rest

It is important to rest your mind to deal with stress and be clear headed

Personality development

This is the period when you want to show your capabilities, be appreciated, show leadership, make independent decisions. Self esteem and personality are developed through these qualities.

Social needs

Education

To maintain an acceptable social standard and get good employment, an adequate level of education is needed.



Figure 2.2 - Peer groups

Socializing with peers

This helps to exchange ideas and interests. The feeling of not being isolated increases self esteem.

Spiritual needs

Learn and practice a form of meditation according to your religion and engage in religious practices together with your parents.

Problems encountered when providing needs of adolescents

Many challenges and problems are encountered during adolescence. Below are few such problems one may face.

1. Deterioration in financial status
2. Inadequate rest
3. Neglect
4. Get misled by others, into wrongdoing
5. Inappropriate relationships
6. Not getting adequate sexual education
7. Inability to balance education and other activities

Steps we can follow to make adolescence a success

1. Engage in educational activities
2. Engage in extra curricular activities
3. Good time management
4. Listen to teachers, parents and trustful elders' advice
5. Associate with good friends
6. Develop the abilities of being creative, making good decisions, rational thinking and good communication.



Figure 2.3 - Developing creative abilities

Activity

Write how you coped in the following situations.

1. An instance where your father/mother scolded you for spending a long time in-front of the TV/ computer
2. When your closest friend got angry with you
3. An occasion when your friend persuaded you to go against your parents' wishes
4. When you were disappointed with a result at an exam
5. When a stranger got into an argument with you or your family

Ask an experienced older cousin how he/she would act in a similar situation and add their comments to your answers.

Youth- The period between 20 to 39 years of age

The period between 20 to 39 years of age is youth. This is the period with most human resources. When social responsibilities and duties are performed and one becomes a responsible citizen. By this time the person becomes mature, completes the education, finds jobs and attempts to establish himself in a wide social circle.



Figure 2.4 - Youth

Needs of youth

Physical needs

Nutrition

It is important that you consume foods that generate high energy needed to function and prevent diseases. You should not get used to bad dietary habits that lead to non-communicable diseases.

eg: instant food
food with high salt, sugar or oil

This is the child bearing period, so females should pay more attention to their diet.

Exercise

Exercise might be neglected due to the work load during this period. Obesity, being out of shape, increase in weight and getting non-communicable diseases can occur as a result of this. This can be prevented by sparing some time for exercise and sports.

Rest

Working hard for an extra income and family involvements might not allow you to get adequate rest and can result in ill health. It is important that you identify a form of relaxation suitable to you.

Sexual Needs

A tendency towards sexual needs.

Psychological needs

Rest

Mentally too one should get rest. Stress can be prevented by not being excessively competitive and agitated.

Love and marriage

This is the period where love affairs may end in marriage. In marriage the commitment, economic stability and social status should be considered. Acting on reasoning than on emotions will help to lead a good life. Education and other activities should be balanced. Marriage should be considered at a suitable age to have a successful family life.

Social needs

Higher education

You should enter a field where there is scope and suitable social status, when progressing with higher education.

Employment

It is important that you find a job suited to your level of education and social acceptance.

Housing and possessions

During this period you strive to own a vehicle and home to live a socially accepted life style.

Spiritual needs

It is important that you engage in some form of religious activities to fulfil your spiritual needs. Practice a religion you believe in.

Challenges and issues faced by youth

- Deterioration in economic status
- Not getting suitable employment
- Not having suitable educational qualifications
- Restlessness and competitiveness

You may notice that the above issues are interrelated. Inadequate educational qualifications lead to unsuitable employment which in turn leads to a poor socio

economic status. Therefore to make youth a successful period it is important to lay a good foundation during childhood and adolescence.

In addition, unrest at work and not having an understanding about people causes problems with your associates.

Steps to overcome problems

1. Achieve a high level of education
2. Obtain necessary qualifications for suitable employment
3. Develop skills to get an additional income
4. Have an aim in life
5. Good time management
6. Lead a responsible life with understanding
7. Get involved in creative and religious activities



Figure 2.5 - Achieve a high level of education

Middle age- period between 40 to 59 years

The age group between 40 years and 59 years is called middle age. By this age one portion of this sector who have achieved success in life, face it efficiently and with maturely. The other portion is trying to correct the mistakes and trying to achieve success. Stress, unrest and emerging illness may disturb the life style of this age group.



Figure 2.6 - Middle age

Needs during middle age

Physical needs

Nutrition

There is a risk of getting non-communicable diseases so consumption of sugar and oil should be minimized. It is important that you control your weight and have a balance meal.

Exercise

It is important to engage in daily exercise and lead an active life style

Rest

Although this can be a specially in-restful period, more rest is needed than in a youth

Psychological needs

Love

You might feel depressed if your children have migrated or are living separately after marriage

Rest

Physical and mental rest is needed.

Social needs

Desire for promotions and increase in salary to be financially stable
Interest in children and welfare of their families
Interest in obtaining additional source of income

Spiritual needs

Be more involved in religious activities and become more spiritual
Get more involved in charity and creative activities to reduce stress

Problems encountered during middle age

If a solid foundation has not been laid in previous stages this stage can become problematic.

Some issues are given below.

1. Financial difficulties
2. Difficulties in employment
3. Unrest
4. Illnesses
5. Distance from children
6. Sexual problems

Ways of overcoming difficulties to lead a good middle age

- Proper management of finances
- Time management
- Exercise
- Necessary treatment
- Developing good habits
- Guide children in the proper path
- Engage in children's activities in a tactful way
- Recreational activities
- Social welfare activities
- Religious activities to improve one's spiritual life



Figure 2.7 - Involve in religious activities

Old age- Period after 59 years

People over 59 years are referred to as the elderly

Some physical changes occurring during this period are given below

- The skin gets thin, loses its elasticity, becomes dry and wrinkled.
- Hair turns gray and becomes fine and falls.
- The head protrudes forward compared to the body. Shoulders get hunched and become more concave. Therefore the height too is slightly reduced at this age.
- There can be problems associated with hearing, the skeletal system, taste and body functions.

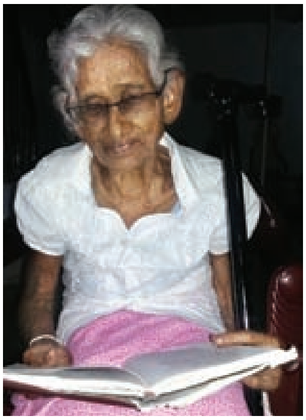


Figure 2.8 - old age

Needs during old age

Physical needs

Nutritional needs

The body becomes weak in this period. There is no growth. Therefore energy producing foods including proteins and minerals are very important.
The menu has to be changed depending on the illnesses one has.

Exercise

Age appropriate exercise has to be done as in other stages. Illnesses can be minimized by engaging in daily activities energetically.

Rest

Expects more rest

Psychological needs

Love

Expects more love and attention from others than during previous stages of life. Isolation and loneliness due to children living away. Expects love and kindness from children and grandchildren

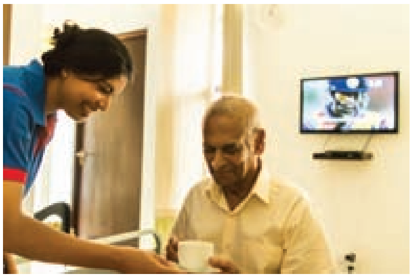


Figure 2.9 - Love and attention

Social needs

Important to stay on good terms with children and neighbours. Likes when prominence is given at public places such as hospitals, banks etc., transport facilities and loan concessions. Likes to hold important positions in committees to feel that they are of some service to the society and likes to be appreciated by others.

Spiritual needs

Stress and loneliness during this period can be overcome by engaging in religious activities. Spiritual development should be sought through religion. Even though one's physical and other desires not fulfilled, he/she will be ready to accept it through religion. Religion will give a hope to live and in advance stages of spiritual maturity will give the courage even to face the death peacefully.

Issues faced when supplying needs of the elderly

Problems faced when overcoming loneliness and helplessness which are felt more in this period are given below.

1. Poor socio economic status
2. Different illnesses
3. Physical weakness
4. Distance from children
5. Distance from society
6. Difficult in controlling emotions

Ways of reducing problems of old age

1. Engaging in more religious activities
2. Understanding the future and facing it
3. Getting involved in social work or household activities
4. Remain socially active by joining societies for the elderly
5. Control impulses



Figure 2.10 - Reading religious books

Activity

The elderly population is growing very fast but care of the elderly is deteriorating gradually. Write an essay on " It is our duty to look after the elderly" stating how this situation can be prevented from getting worse.

It is important as an adolescent that you try to help the elderly as much as possible.

As an adolescent, try to pay more attention to your grandmother or grandfather. Ask your parents how your grandparents helped to look after you when you were an infant. You will remember the way they showed their love and affection to you when you were a child.

Your grandparents might be weak or disabled, but don't forget to care for them by showing your love and affection. Do you understand how that it will help them to live in the evening of their lives?



Figure 2.11 - Looking after the elderly

Activity

Identify people of different age groups in your home or relations/ friends or neighbours.

Using the information given below, make a questionnaire to see if their physical, social, mental and spiritual needs are met.

Nutrition: The food they eat
The food they like to eat but don't get often
The amount eaten from each item
eg: breakfast; 1 cup of rice,
2 tablespoons of vegetables

Exercise: Engage in exercise
Daily/weekly/how many days a week
Type of exercise: walking / running
Duration of exercise : ½ hour

Summary

Four post childhood stages with differences can be identified. They are adolescence, youth, middle age and old age.

Each stage has its own physical, mental, social and spiritual needs. Fulfilling these needs lead to different problems.

Identifying ways of overcoming these challenges at every stage will help us lead a happy life.

You are currently in the adolescent stage and should strive to work harmoniously with people in other stages and contribute to alleviate their problems.

Exercise

1. Line up the different stages from childhood to the end of life?
2. Name six needs during adolescence
3. What are your social responsibilities as a youth?
4. Name four social needs during youth
5. Name five common needs in middle age and old age
6. What are the skills you should develop to solve problems and lead a successful life?

3 Let us identify principles of biomechanics to maintain correct postures

Maintaining a correct postures means keeping the body parts in proper positions so that minimum amount of energy is spent and no strain is caused to any part of the body during movement or remaining still. Maintaining correct postures pave the way for the development of a fine personality. It is difficult for every individual to maintain postures in the same way as others. The way that postures are maintained may differ from person to person depending on factors like body weight, body size and age. In order to maintain correct postures, it is important that you learn the principles of biomechanics.

Out of the principles of biomechanics that influence postures, you learned the two principles ‘centre of gravity’ and ‘balance’ when you were in Grade 10.

In this lesson you will learn some more principles of biomechanics that influence postures and physical activities, and how the body and equipment are manipulated using those principles.

Principles of biomechanics that influence postures

Postures are mainly of two types:

1. Static postures
   eg: sitting, standing, lying
2. Dynamic postures
   eg: running, jumping, walking

The following principles of biomechanics influence these postures.

1. Centre of gravity
2. Balance
3. Inertia
4. Force
5. Direction of force
6. Momentum

As we have already learnt about 'centre of gravity' and 'balance', let us now study the other principles of biomechanics.

Inertia

Inertia is the property of resistance of a body that remains at rest to move or the resistance of a body that is in motion to stop.

Let us consider two objects (A and B) that have been kept on the ground for lifting. If it is more difficult to lift object B than A, inertia of the object B, or the resistance of object B to move, is higher. (Figure 3.1)

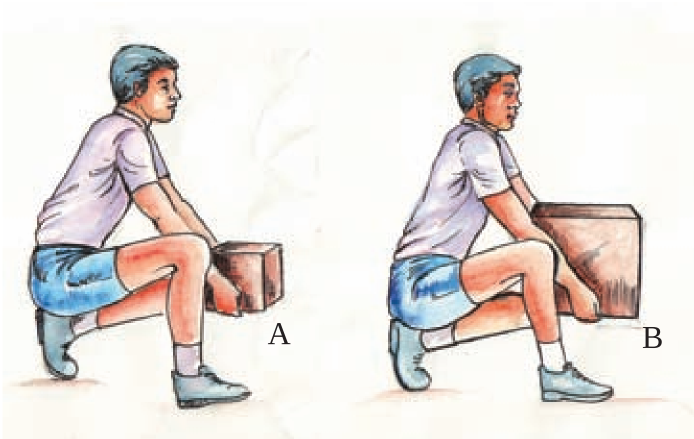


Figure 3.1

Think of a leather ball and a tennis ball that are rolling over. You will understand that it is easier to stop the tennis ball than stopping the leather ball. This means that inertia of the leather ball is higher.

Force

An effect that causes an object which remains at rest to move or which changes the nature of motion of an object in motion is called a 'force'.

When a weightlifter is lifting a barbell that is on his shoulders, he pushes it upwards. When the barbell that is on the ground is lifted, the weightlifter has to pull it upwards. We see such acts of pushing and pulling in different forms in sports. (Figure 3.2)

Actions like pulling, pushing and lifting are results of exerting force.

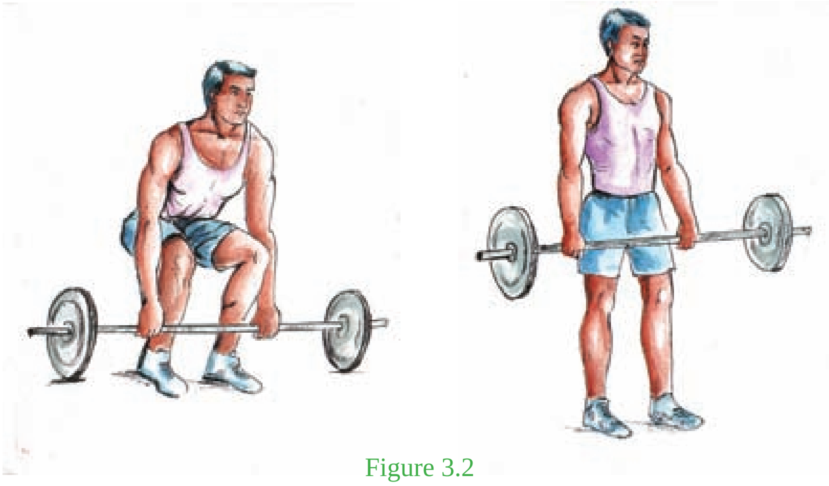


Figure 3.2

When a sprint race is about to start, a sprinter stands still bracing his feet against the starting block. In order to break this stillness, the sprinter has to exert some influence. The influence that breaks the stillness is a force. The force that breaks the stillness of the sprinter is the force of the reaction that is produced as a result of the pressure exerted against the starting block by the sprinter. (Figure 3.3)

When the ball is coming towards a batsman, he hits it with his bat in order to change the direction of motion of the ball by exerting some force on it.

The force necessary for a sportsman for motor activities is generated by the contraction of his muscles.

When an athlete is throwing the shot put, he has to exert some force on it in order to make it move. Further, that force has to be exerted in the direction in which the shot put has to be thrown.



Figure 3.3



For extra knowledge

The first law of Newton that you learnt in Science is as follows:
"Until an unbalanced force is applied on it, bodies at rest remain stationary and bodies in motion continue to move at uniform velocities."

Apply the first law of Newton to the example given above.

Direction of Force

A force has both a magnitude and a direction. Direction of force, too, has an effect on actions. When illustrating the direction of force by drawing a line, the length of the line that is drawn to scale is reflective of the magnitude of the force and the direction in which the force is acting is indicated by the direction of an arrow head.

A weightlifter exerts an upward force in order to lift a weight. Then that object moves in the direction in which the force is exerted. (Figure 3.4)



Figure 3.4

When an athlete jumps up, the ground exerts a force vertically upwards on the athlete because of the force that the athlete exerts on the ground. That means the force acts in the direction of the motion.

For extra knowledge

Recollect the third law of Newton that you learnt in Science.
"For every action, there is an equal and opposite reaction."

Apply the third law of Newton to the example given above.

Momentum

Momentum is a measure of how difficult it is to stop the motion of an object in motion.

When playing "Elle" it is easy for you to catch the ball that a player throws at you, but if a heavier object is thrown at you, it would be more difficult for you to catch it.

Further, even an object that is not so heavy would be difficult to be caught when it is moving very fast.

Accordingly, it is clear that momentum depends on the mass and velocity of an object.

$$\text{momentum} = \text{mass} \times \text{velocity}$$

The momentum of a shot put that is rolling over fast is greater than the one that is rolling over slowly. Further, the momentum of a bigger shot put that is rolling over at a certain speed is greater than that of a smaller one that is moving at the same speed.

When a cricketer catches the ball coming towards him, he exerts some force on the ball with both his hands in order to stop the ball (Figure 3.5). Then the momentum of the ball becomes zero as its velocity becomes zero and consequently the ball stops moving.



Figure 3.5

Effects of principles of biomechanics on activities

Walking

The purpose of the activity of walking is to carry the body from one place to another. While walking, the body moves forwards or backwards and the weight of the body is shifted from foot to foot alternately. Accordingly walking is called an unceasing process in which the balance of the body is lost and regained.

While walking, the balance of the body is maintained by moving hands and legs in opposite directions.

Running

Running is to be pushed forwards by the force that is exerted on the ground by the feet. When running, a runner exerts some force on the ground and consequently an equal and opposite force acts on the runner. The runner moves forwards because of the reactive force that is generated. (Figure 3.6)



Figure 3.6

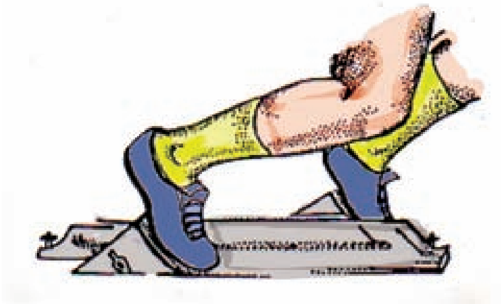


Figure 3.7

At the start of a 100-metre race, a sprinter remains at rest on the starting block. He exerts some force on the block using his feet. As the reactive force generated by the block in response to the athletes force, acts back on him, he is pushed forwards. If that reactive force does not act on him, he remains at rest on the block. (Figure 3.7)



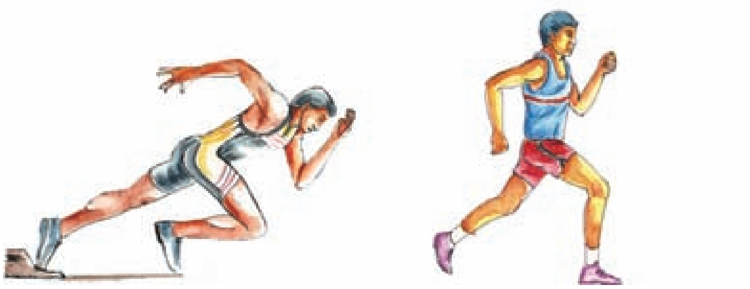
For extra knowledge

Apply the second law of Newton that you learnt in Science to the example given above.

“The acceleration of a body is directly proportional to the unbalanced force acting on it, while it is inversely proportional to its mass."

According to this law, acceleration of an object or an athlete can be increased by increasing the force that acts upon that object or the athlete (a higher rate of velocity change).

The acceleration produced when a sprinter of a 100-metre race takes off at starting block is directly proportional to the force that he exerts on the block. If the force he exerts on the block is greater, the acceleration of taking off the block is greater, too.



3.8 Figure

Jumping and throwing

Releasing an object to the air by throwing or shooting forward, is called a projection and the object that is projected is called the projectile.

In sports and in physical education activities, there are various events in which objects are thrown forwards.
eg: javelin, shot put, discus

Moreover, various pieces of sports equipment are thrown forwards using various techniques.
eg: hitting the ball, kicking the ball

In events like long jump, high jump, triple jump and hurdles, the body of the athlete becomes the projectile.



For extra knowledge

The centre of gravity of a piece of sports equipment or that of an athlete that is taken-off into the air moves along a circular path in the air. This path is called the trajectory.

The following figure shows the path of the centre of gravity of a long-jumper from the time he takes off until he lands.

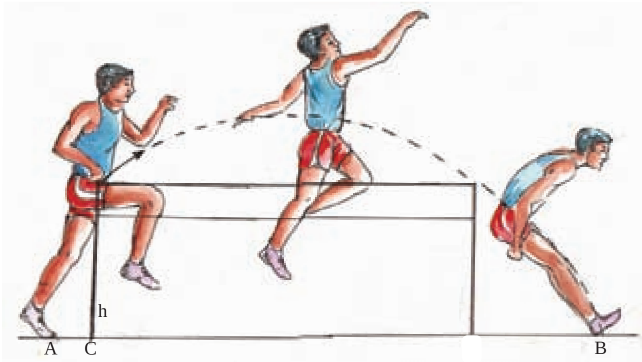


Figure 3.9

C = Point of taking off
B = Landing point
A-B = Distance of the jump
h = Take-off height

Factors affecting the distance or the height of the jump of an athlete

1. Velocity of take-off
2. Angle of take-off
3. Height of take-off

The height or the distance of the jump determined on the above factors cannot be changed by the movements that the athlete makes while he is in the air. In an event like long jump, such movements are only useful in preparing the body for a successful landing. (Figure 3.10)



Figure 3.10

The velosity of the take-off is the most important one of the above factors. In jumping events, the approach run is used to increase the take-off speed.
The optimum take-off angle differs according to the event.

The height at take-off differs according to the height of the body of the jumper and the position of the body of the jumper at the take-off.

Factors that determine the distance of the throw are;

1. velocity of release
2. angle of release
3. height of release

In throwing events like throwing the shot put, discus throw, javelin throw and hammer throw, the distance that the shot put, discus, javelin and the hammer will travel depends on the above factors.

Velocity of release of the equipment
In a throwing event the key factor that determines the distance of the throw of the equipment is the velocity of release of that equipment. The magnitude of the force exerted on the equipment depends on the direction of force, the distance and duration of exerting the force and the speed of release of the equipment.

In order to attain the maximum speed of the propellers, the thrower uses different techniques. A discus or shot put thrower by rotating the body and a javelin thrower by running fast, gets the speed. (Figure 3.11)

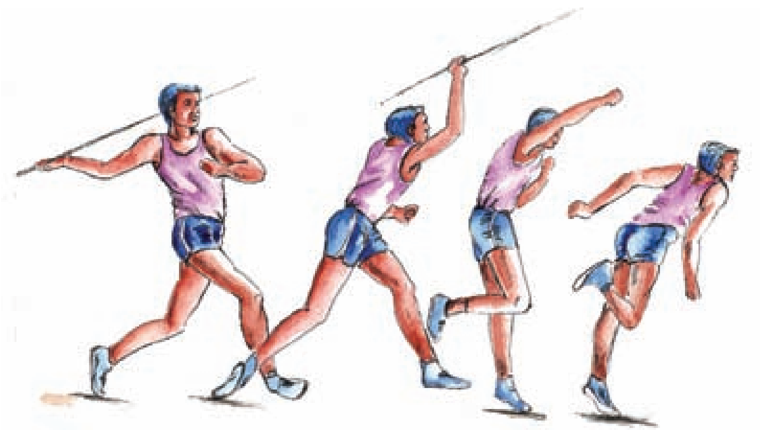


Figure 3.11

Angle of releases of the equipment

The next important factor is the angle of release of the equipment. In throwing events, the optimum release angle differs from event to event.

When a piece of equipment is released in the proper angle, it can be thrown further and when that equipment is thrown at angles greater or lesser in magnitude to the proper angle, the equipment lands at shorter distances.



Figure 3.12

Height of release of the equipment

In a throwing event, the height of release of the equipment is a factor that depends on the height of the athlete. An athlete who is taller than another can release the equipment at a greater height when compared to the shorter one. If all the other factors are equal, the athlete who releases the equipment at a greater height is in a slightly advantageous position. (Figure 3.13)



Figure 3.13

Summary

It is important to maintain correct postures in order to live a healthy life.

The centre of gravity and balance, inertia, force, direction of force and momentum, are also included in the principles of biomechanics that influence postures.

Inertia is the property of resistance of a body that remains at rest to move or that of a body that is in motion to stop.

An effect that causes an object that remains at rest to move or that changes the nature of motion of an object in motion is called a ‘force’. A force has both a magnitude and a direction.

Momentum is a measure of how difficult it is to stop the motion of an object that is in motion.

These principles of biomechanics influence in dynamic postures like walking, running, throwing, and also in sports activities.

In jumping, the path that the centre of gravity of the athlete takes depends on the take-off velocity, take-off angle, and take-off height. In throwing, the path that the equipment takes depends on the velocity of release, angle of release, and the height of release.

Exercise

1. Name six principles of biomechanics that influence postures.
2. What are the three factors that determine the height and the distance that an athlete would jump in a jumping event?
3. What are the three factors that determine the path that a sports equipment takes in a throwing event?

4 Let us play volleyball

Two teams of six players in each are needed to play volleyball. Volleyball is played in a court of 18m x 9m which has been divided crosswise by a net into two equal halves. The team to serve first is selected through the toss of a coin between the two captains. The play starts as the player on the right back of the selected team serves the ball to the opposing team. A team can win a point if the ball lands on the court of the opponent's side or due to an offence committed by the opposing team.

Recollect the basic skills of volleyball that you learnt from Grade 6 onwards namely, serving, receiving, setting, attacking, blocking, and defending. The game of volleyball has been created through the combination of those skills. You remember learning the rules and regulations related to attacking and blocking, and the official hand signals used in judging volleyball matches when you were in Grade 10.

In this lesson, we will learn about the rules and regulations related to positions that are very important in playing volleyball.



Figure 4.1 - A game of volleyball

Activity

Join your friends and get into two groups of six. Play a volleyball match applying the skills and rules and regulations you have learnt so far. The team to score 10 points first becomes the winner.

Positions in Volleyball

When playing volleyball, the players should comply with the following order of rotation of positions:

The positions of players in volleyball are numbered. The order in which the players are positioned before the start of the play is considered the initial order of players. This order should be maintained until the end of the particular round of play. Before the start of the play in each round of a match, the coach of the team should prepare the line-up sheet, sign it and hand it over to the second referee or to the scorekeeper in time. Except for the libero, who is not included in that line-up sheet, the other players are considered to be substitute players of that round. After the line-up sheet that contains the order of players has been handed over, the order of players cannot be changed, but a substitution can be made if necessary. If there is any change in the order of players before the start of the play, it can be corrected in accordance with the line-up sheet and players should be positioned accordingly. A penalty is not given for that.

Positions of Players

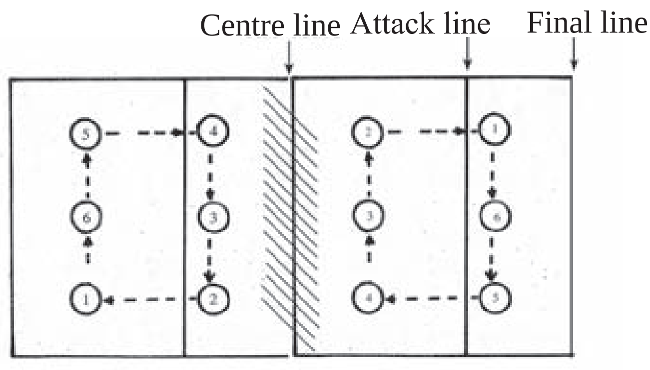


Figure 4.2 - Positions in volleyball

While the ball is being served, all the players of both teams, except for the server, should remain inside the court. The six players of each team should stand in 2 rows of three players each. The three players standing close to the net are called the front row and the other three players are called the back row.

The three players in the back row should be positioned behind the players in the corresponding positions of the front row. According to the rules related to the six positions of volleyball, the three positions of the first row are named zone 2,3 and

4, and the three positions in the back row are named zone 5,6 and 1. The server should always be in number 1 position.

Although there are several ways of positioning players in volleyball, the beginner players are positioned in a ‘W’ formation as shown in figure 4.3.

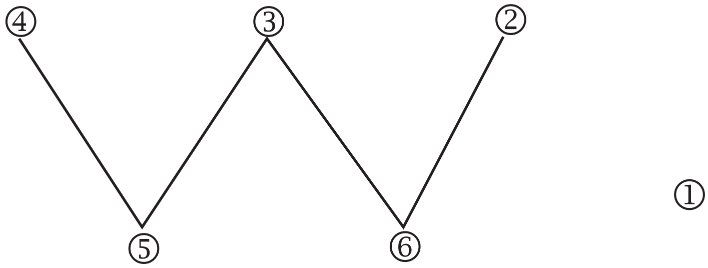


Figure 4.3 - W formation

The position of a player in the court is determined based on the place in which the soles of the player’s feet lie. The front row player's foot should lie closer than that of the back row player's foot is to the centre line at least by a small distance. The foot of the side player should lie closer than that of the middle player to the side line. After the ball has been served, the players can play within their playable areas or by moving to any part of the free zone.

Offences related to player positions

While the ball is being served, the other players should remain in their positions and it is an offense to be outside their positions. While the ball is being served, if offences are committed with regard to player positions and service both, first a penalty is given for the offence related to the service. If the ball fails after it has been served, it is disregarded and the penalty is given for the offence related to player positions.

The following penalties may be given for offences related to player positions

- As a penalty given to the team that committed the offence, the service and a point are awarded to the opposing team.
- The players should revert back to their correct positions.

Player rotation

When a team has received the service after winning a rally with the other team, the players of the team that has received the service have to rotate positions clockwise around the court. The player in zone 2 should move to zone 1 and serve the ball while the player in zone 1 should move to zone 6.

Rotation offences

A player rotation offence is a rotation of the sever position in a wrong order. The following penalties are given for rotation offences.

- As a penalty given to the team that committed the offence, the service is awarded to the opposing team.
- The opposing team is awarded a point.
- The players should rotate again so that they are in the correct positions

Summary

In volleyball the players have to position in the court according to the accepted order. The six players of each team should be positioned in two rows of three players each so that there is a front row and a back row.

There are rules and regulations related to these player positions. When a player has to change position, the team has to rotate clockwise so that each player moves by one position.

Players not being in the correct positions while the ball is being served and the team not rotating in the correct order are considered offences. Players are given penalties for offences related to player positioning and player rotation.

Exercise

1. Explain the rule of player positions in volleyball.
2. What are the penalties given for positioning offence?
3. Explain what is meant by a player rotation offence.

5 Let us play netball

Netball is played between two teams of seven players each. However, twelve players can be registered for a netball team, and a netball match can be played with a minimum of five players. Each player should wear a bib showing the abbreviation that indicates the player position and the two teams should wear bibs of different colours so that the two teams can be identified clearly. The captains of the two teams should toss a coin to start the match. The team that wins the toss can select either the ball or the side of the court. After the toss has been won, the two captains should inform it to the umpires who then toss a coin between them selves to select their roles. When the umpire blows the whistle, the two teams should take their positions inside the court.

In previous Grades you learnt netball skills such as ball controlling, footwork, attacking and shooting. The game of netball has been created with the combination of those skills. When you were in Grade 10, you learnt the rules and regulations related to the position of players, playing time, attacking, defending and shooting in netball and also about the hand signals used by umpires in judging netball matches.

In this lesson we will discuss briefly the penalties that are given for the offences the players commit when playing netball.



Figure 5.1 - Game of netball

Activity

Divide yourselves into two groups and play a netball match following the rules and regulations that you learnt when you were in Grade 10. Those who are not playing can be the umpires.

Penalties given in netball are as follows:

1. Free Pass
2. Penalty Pass
3. Penalty Pass or Penalty Shot
4. Throw in
5. Toss Up

Free pass

For all the offences committed by a team, except for the obstructions caused to a player or players of the opposing team (eg: obstructions, impeding contacts, committing offences by two opposing players simultaneously, obstructions related to goal post), the opposing team is awarded a free pass. If a goal shooter gets a free pass when she is within the goal circle, she cannot shoot that ball.

Any player in the opposing team who is allowed to play in that area can get the free pass from the place where the offence was committed.

Occasions where a free pass is awarded

A free pass is awarded for committing the following offences:

Offences committed in handling the ball

- Rolling the ball over the ground
- Throwing the ball up and catching it again before it touches any other player.
- Throwing the ball while lying, sitting or kneeling on the ground.
- Holding the ball for over three seconds – this is called the three-second law.
- When passing the ball, the distance between the two players being less than 3 feet.
- Receiving the centre pass without touching the centre area or moving to the

centre area before the whistle has been blown.

- Players moving to areas that they are not allowed to.
- Throwing the ball over two transverse lines without being touched.
- Using the goal post as a support in receiving the ball.

Offences related to footwork

- Dragging along the ground or slipping the landing foot of the player holding the ball.
- Jumping on a foot holding the ball.
- Going a few steps holding the ball.
- Jumping up on both feet and landing on both feet without releasing the ball from hands.

The ball should be released from the hand before the foot that was used for landing after the ball has been caught is raised and landed once again. This is the rule related to footwork.

Offences related to players

- Incorrect substitution of a player or improper changing of teams.



Figure 5.2 - Awarding a free pass

Penalty pass

A penalty pass is awarded for the offences committed by two or more players of the two teams outside the goal circle.

The player who committed the offence should not join the play until the ball has been released from the thrower's hand.

Occasions where a penalty pass is awarded

- Obstructing the player in possession of the ball being within a distance of less than 3 feet from the landing foot of that player.
- Stretching the hands or extending the knees forwards when defending.
- Coming into contact with, pushing, causing to fall hitting the opposing player or grabbing the ball off the opposing player while defending or attacking.
- Falling on or jumping upon a player of the opposing team, extending the elbow, pushing with the ball in hand a player of the opposing team or punching the ball.
- Holding on to a player of the opposing team either deliberately or accidentally.



Figure 5.3 - Awarding a penalty pass

Penalty pass or penalty shot

For offences committed within the goal circle by a player, a penalty pass or a penalty shot is awarded to the opposing team from the place where the offence was committed. The player who committed the offence should stand beside the thrower so that the thrower is not disturbed and should not join the play until the ball has escaped the thrower's hand.

Occasions where a penalty pass or penalty shot is awarded

- Same occasions where a penalty pass is awarded, committed within shooting circle.
- Extending the hands within the obstructing distance (3 ft.) so that the shooting is obstructed.
- Touching the ball with the hand or hitting the ball.
- Shaking the goal post or coming into contact with it by the defending player with the intention of obstructing the shooting.

Throw-in

When the ball runs out of the court, throwing it back into the court is called throw-in. The player throws the ball into the court setting the foot close to the boundary line from outside the court at the place where the ball ran out from. The rules related to footwork and three-second rule should be followed when taking the throw-in.

A throw-in is awarded when

- the ball touches the ground outside the court or when it touches a person or an object outside the court.
- a player who is touching the ground outside or touching a person or an object outside the ground catches the ball.
- a player who is touching the ball touches the ground outside the court.



Figure 5.4 - Throw-in

Toss up

On occasions where it is difficult to decide on the player who should be given the ball out of two opposing players, the ball is tossed up between them. The toss up is taken between the two players who were involved in the offence and at the place inside the court that is closest to the place where the offence was committed.

The two players should stand facing each other and their own goal ends with arms straight and hands to sides, but feet in any position. There should be a distance of 3 feet between the nearer feet of the two players. They shall not move from that position until the whistle is blown.

The umpire should keep the ball on the palm of her hand that is held at a level that is slightly lower than the shoulder level of the shorter player when she is in her usual standing position, and should blow the whistle and toss the ball up from a midpoint between the two players so that the ball does not go more than two feet up.

A toss up is taken when

- opposing players gain simultaneous possession of the ball with either or both hands;
- opposing players simultaneously knock the ball out of court;
- opposing players are simultaneously offside, one in possession of or touching the ball;
- opposing players make simultaneous contact;
- the umpire is unable to determine the last player to touch the ball before it goes out of court;
- after an accident, the umpires are unable to say who had the ball, or when the ball was on the ground when play was stopped.



Figure 5.5 - Tossing the ball up between two players

Judging netball matches

It is very important that netball matches are judged following the rules and regulations of the game giving players the relevant penalties in order to control netball games and to make decisions. A netball match is judged by two umpires and it is their responsibility to ensure that the following are in order:

- the court, shooting posts, and the ball
- players are wearing bibs, have trimmed finger nails and have removed jewellery.
- the 3-metre wide free zone around the court has been arranged so that the play or the judging is not disturbed.

- availability of two umpires for controlling the game and for making decisions and that they get to know each other.
- the captains of the two teams toss a coin between them and its result is conveyed to the umpires and the scorekeepers.
- the umpires judge the side that they are in charge of.
- stopwatches and score keepers are kept ready.

The umpire who wins the toss controls the half of the court that is towards the north. The umpires can use hand signals when necessary in order to further clarify the decisions that are given to players. (Refer to page 62 of Health and Physical Education textbook for Grade 10.)

You can develop the skills necessary for judging netball matches through a close study of the above facts and by engaging in play following those rules and regulations.

Activity

State what decisions you would give the players as the umpire in the following situations:

i. The team in blue has received the centre pass. After the umpire has blown the whistle, the centre player (C) plays the centre pass to the goal defence (GD). This ball is not touched by any player in the centre area and when the ball comes to the goal area it is taken by the wing attack (WA).

ii. The centre player (C) of the team in red passes the ball to the Gall Attack (GA) of her team who is in the goal circle of their team and the Gall Attack (GA) runs forwards to catch the ball, but the Gall Defence (GD) of the team in blue intentionally comes into contact with the Gall Attack (GA) of the team in red and the Gall Attack (GA) then misses the opportunity of catching the ball.

Summary

Free pass, penalty pass, penalty pass/penalty shot, throw-in and toss up are the penalties that are given for the offences committed by players in netball.

Free pass is awarded for all the infringements committed by the player holding the ball except for the obstructions caused to the opposing player.

A penalty pass is awarded for the infringements committed by two or more players outside the goal circle.

A penalty pass / shot is awarded for infringements committed by players within the goal circle.

When the ball goes out of the court, a throw-in is awarded.

If it is difficult to determine which of the two opposing players should get the ball, the ball is tossed up between the two players.

Gaining knowledge about the infringements for which the above penalties are given is important in playing, as well as in judging netball.

Exercise

1. State five offence that are committed by netball players while handling the ball, for which a free pass is awarded.
2. Write three infringements for which a penalty pass is awarded in netball.
3. Write two rules that should be followed when taking a ‘throw-in’ in netball.
4. Describe how the umpire tosses the ball up between two opposing players in netball.
5. What are the things that the umpires should check before the start of a netball match?

6 Let us play football

Football has been played since ancient times and today it is a very popular and enjoyable game. A special feature of this game is that it provides the opportunity for the participants to engage in playing for a long time which helps develop all the skills needed for enhancing physical fitness. Two teams of eleven players each are required to play a football match. The team that wins the toss can opt to select the side of the field or to start the play. In football, teams can score goals by playing the ball into the goal of the opposing team.

The game of football has been created with a combination of a number of skills such as dribbling the ball, kicking the ball, controlling the ball, heading the ball, throw-in, defending the field, and goal keeping. You have learnt and practiced those skills when you were in previous grades. When you were in Grade 10, you learnt the skills of kicking the ball, controlling the ball and heading the ball, and you also learnt some of the rules that should be followed in playing football matches as well as the signals used in judging a football match.

In this lesson we will study some key rules that are relevant to various occasions of a football match.



Figure 6.1 - A football match

Activity

Divide yourselves into two teams of eleven each and play a football match following the skills and the rules and regulations you have leant so far.

Kick off



Figure 6.2 - Kick off

A kick off is the method of starting or restarting a play. A kick-off is used in the following occasions:

1. At the beginning of a match
2. After scoring a goal
3. At the start of the second half of a match
4. At the start of each period of extra time if the two teams are on a tie.

The procedure for kick-off is as follows:

The ball should be placed stationary on the centre mark. All players must remain in their own half of the field of play. The opponents of the team taking the kick-off should remain at least 9.15 m away from the ball until it is in play. After the referee has given the signal, the ball may be kicked so that it either moves forwards or it is directly played into the goal. (A goal may be scored directly from a kick-off.) The player who takes the kick-off can touch the ball again only after it has been touched by another player.

Ball in play/out of play

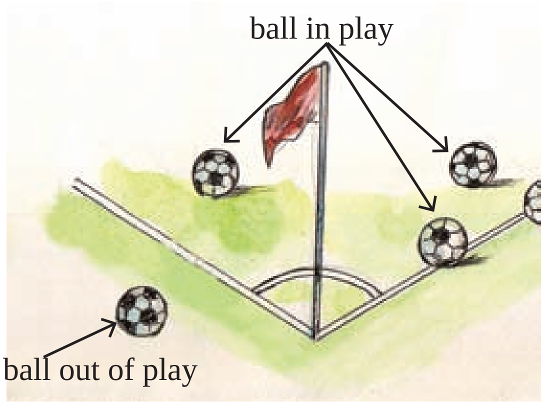


Figure 6.3

In football the ball is in play and the ball is out of play on the following occasions

The ball is out of play when:

i it has wholly crossed the goal line or touch line,on the ground or in the air
ii play has been stopped by the referee

The ball is in play when:

i it rebounds off a goalpost, crossbar or corner flag-post and remains in the field of play
ii it rebounds off either the referee or an assistant referee when they are on the field of play

scoring

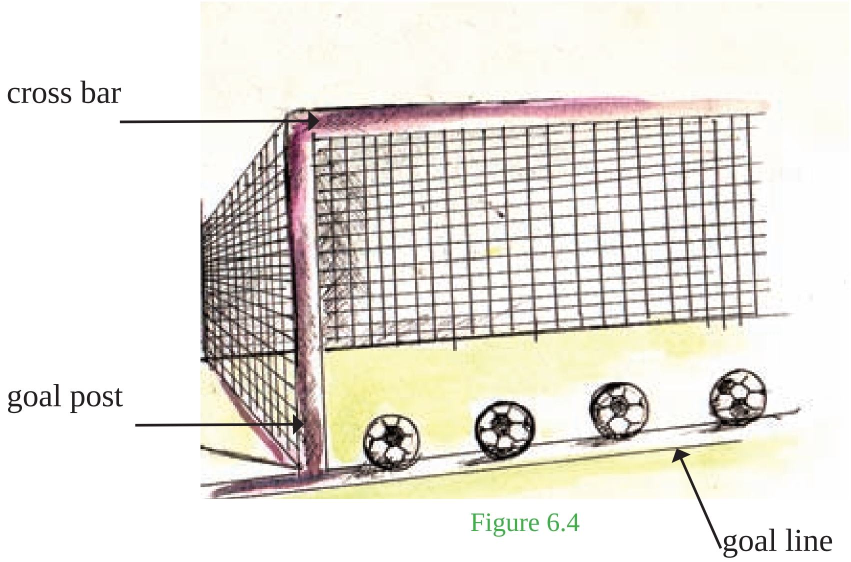


Figure 6.4

A goal is scored when the whole of the ball passes over the goal line, between the goal posts and under the crossbar, provided that no infringement of the laws of the game has been committed previously by the team scoring the goal.

Free kick

When a player commits an infringement, the opposing team is awarded a free kick.

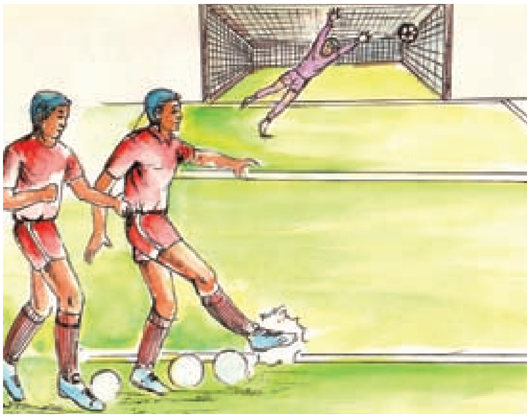
When taking the free kick, the ball should remain stationary and the opponents of the team taking the free kick should remain at least 9.15 m away from the ball until it is in play. The player who takes the free kick can touch the ball again only after it has been touched by another player.

The free kick is divided into two as follows:

i. direct free kick – a goal can be scored directly from a direct free kick.
ii. indirect free kick - a goal cannot be scored directly from an indirect free kick.



Direct free kick



Indirect free kick

Figure 6.5

Penalty kick

If a player commits an infringement inside the penalty area of his team, a penalty kick is awarded to the opposing team. When the infringement is committed, the ball should be in play and the position of the ball is not taken into consideration.

Except for the player taking the penalty kick and the goal keeper of the opposing team, all the other players should remain outside the penalty area.

Facts to be taken into consideration related to penalty kick

- The referee must identify the player taking the penalty kick.
- The ball should remain stationary on the penalty mark.
- The ball should be kicked forwards.
- The defending goalkeeper must remain on his goal line, facing the kicker, between the goalposts until the ball has been kicked.
- If additional time is required for the penalty kick, the time taken for that should be added to the relevant half of the play.

Offside position

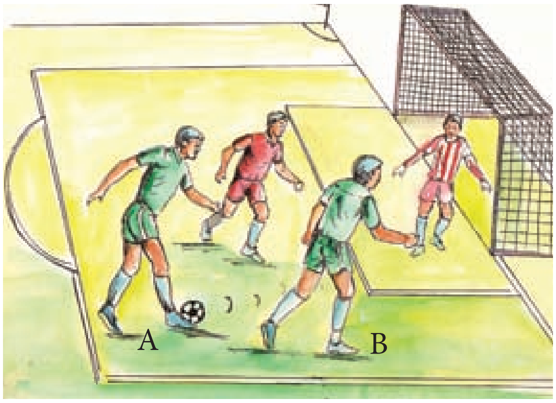


Figure 6.6 - Offside position

A player is considered to be in an offside position if he is nearer to his opponents' goal line than both the ball and the second-last opponent. When a player is in offside position the player's active involvement in play is taken into consideration.
The law of offside position will not be applicable if a player receives the ball directly from:

- a goal kick
- a throw-in
- a corner kick

In the event of an offside offence, the referee awards an indirect free kick to the opposing team to be taken from the place where the infringement occurred.

Fouls and Misconduct

A penalty kick is awarded to the opposing team from the penalty mark if a player intentionally commits a serious offence in the penalty area. If such an offence is committed in some other area of the field, a direct free kick is awarded from the place where the offence occurs.

A direct free kick is aw—arded to the opposing team if a player commits any of the following offence:

I. kicks or attempts to kick an opponent



Figure 6.7

II. trips or attempts to trip an opponent



Figure 6.8

III. jumps at an opponent



Figure 6.9

IV. handles the ball deliberately, hitting it with hand or carrying it



Figure 6.10

V. strikes or attempts to strike an opponent



Figure 6.11

VI. pushes an opponent



Figure 6.12

VII. holds an opponent



Figure 6.13

VIII. align tackles an opponent
IX. spits at an opponent

Throw-in



Figure 6.14 - Throw-in

A throw-in is awarded to the opposing team when the whole of the ball crosses the touch line, either on the ground or in the air. The throw-in is awarded to the opponents of the player who last touched the ball before it crossed the touch line.

- A throw-in is a method of restarting play.
- A goal cannot be scored directly from a throw-in.

The following should be taken into consideration when the throw-in is taken:

- Both foot of the thrower should be touching the ground.
- At the moment of delivering the ball the thrower should be facing the field of play.
- Should deliver the ball from behind and over the head.

- Should be holding the ball with both hands when delivering the ball.
- After delivering the ball, the thrower must not touch the ball again until it has touched another player.
- The opponents must stand not less than 2m from the point at which the throw-in is taken.
- The ball may be thrown either being in standing position or by approaching the place running.

Goal kick



Figure 6.15 - Goal kick

A goal kick is awarded to the defending team when the whole of the ball passes over the goal line, either on the ground or in the air, having last touched a player of the attacking team.

- The goal kick is taken from any point within the goal area of the half from which the ball ran out of the field.
- When taking the goal kick, the opponents should remain outside the penalty area until the ball is in play.
- A goal may be scored directly from a goal kick.
- In a goal kick, no player should touch the ball until it has passed the penalty area.

Corner Kick



Figure 6.16 - Corner kick

A corner kick is awarded to the attacking team when the whole of the ball passes over the goal line between the goal posts and the corner flag-posts, either on the ground or in the air, having last touched a player of the defending team.

- When taking the corner kick, the opponents should remain at a distance not less than 9.15m until the ball is in play.
- The kicker must not play the ball again until it has touched another player.

Summary

The kick-off is used for starting the play of a football match or for restarting the play during a match.

In football, several occasions where the ball is in play and the ball is out of play can be identified separately.

In order to score a goal in football, the whole of the ball should pass over the goal line, between the goal posts and under the cross bar

When a player commits an infringement, the kick that is awarded to his opposing team is called a free kick. It is divided into two as direct free kick and indirect free kick.

The kick that is awarded to the opposing team when a player commits an infringement inside the penalty area of his team is called a penalty kick.

If a player remains nearer to his opponents' goal line than both the ball and the second-last opponent, he is considered to be in an offside position.

A throw-in is awarded to the opponents of the player who last touched the ball before the whole of the ball crosses the touch line, either on the ground or in the air.

A goal kick is awarded to the defending team if the whole of the ball passes over the goal line, either on the ground or in the air.

A corner kick is awarded to the attacking team when the whole of the ball passes over the goal line having last touched a player of the defending team.

Exercies

1. Name four occasions where a kick-off is taken.
2. Name two occasions each for ball in play and ball out of play.
3. Name one occasion each on which a direct free kick and an indirect free kick are awarded to the opposing team.
4. Write five offences committed by players which result in awarding a direct free kick to the opponents.
5. What are the factors that should be taken into consideration when a throw-in is taken?
6. Write the occasions on which penalty kick, goal kick and corner kick are awarded.

7 Let us use equipment adapting correct postures

We have to engage in different activities in our day-to-day life including pushing, pulling, lifting weights and lowering weights. When engaging in sports, too, we have to engage in activities which may include pushing, pulling, lifting or lowering. When doing these activities, the body must be kept in correct postures. By maintaining correct postures, damages that could be caused to the body can be minimized and correct posture enables us to perform the activity with ease.

In lesson 3, you identified the principles of biomechanics that influence postures.

In this lesson we will learn how to manipulate equipment, applying the knowledge of principles of biomechanics.

Pushing equipment

When pushing something,

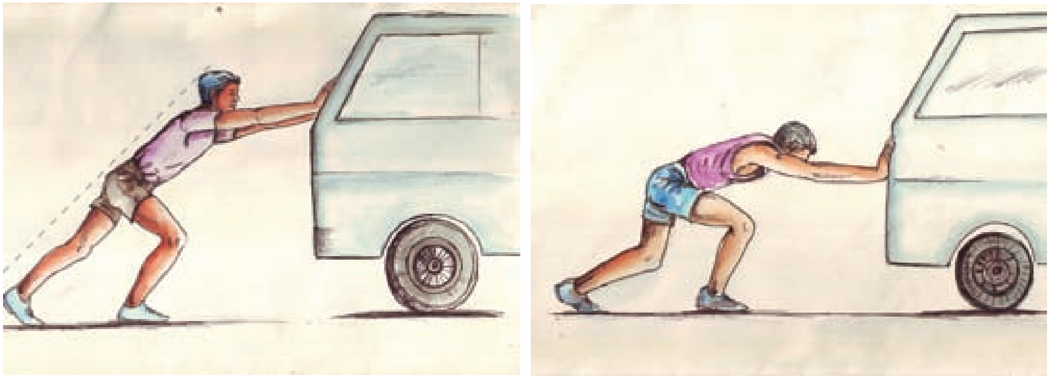
1. body leans forwards.
2. feet should be kept apart and the supporting base should be wider.



Figure 7.1 - Pushing equipment

When pushing a vehicle,

- move one foot backwards and keep the body leaning forwards so that the head and torso lie straight.
- then the force that is gained through the feet can be exerted directly on the object.



✓ Correct posture (a) ✗ Incorrect posture (b)

Figure 7.2 - Pushing a vehicle

Pulling objects

When pulling an object

1. one foot is kept in front and the body is leaned backward at the beginning while the torso and the head lie straight.
2. the feet should be kept apart because the supporting base should be wider.



Figure 7.3 - Pulling a log

Force is gained by pressing the feet against the ground and the correct posture for pulling is maintained by maintaining the body balance.

Lifting a weight

The nature of the posture that should be maintained when lifting an object is as follows:

1. Keep the body straight.
2. Keep the legs a little apart to wide the supporting base.
3. Bend the knees and lower the body.
4. Hold the object close to the body as much as possible.
5. Keep the line of gravity along the central axis of the body.
6. The legs are straightened when lifting the object as that the weight of the object is distributed equally between the two legs.



✓ Correct posture
(a)



× Incorrect posture
(b)

Figure 7.4 - Lifting a weight

Lifting objects in incorrect postures can harm the body. The Figure 7.4b shows a person who tries to lift an object by bending the body forwards. The line of gravity of the person lies outside his supporting base in this posture. Therefore the total weight of the object has to be borne by the spine and it could damage the spine.

Lowering an object which is at a higher position

The nature of the posture that has to be maintained when lowering an object from a hight is shown below:

1. keep the torso and head straight.
2. move one leg a little backwards and keep the supporting base wider.
3. hold the weight close to the body.



✓ Correct posture (a) ✗ lncorrect posture (b)

Figure 7.5 - Lowering an object from a height

Figure 7.5 (b) shows a person is trying to lower some object by standing a little away from the object and placing the both feet close together. When this person is standing in this posture, his body does not lie straight. Then the line of gravity lies behind the supporting base. That makes it difficult for him to maintain the balance of the body.

In figure 7.5 (a) the picture which shows the correct posture, the body of the person lies straight. One leg has been moved backwards and the supporting base is wider. The weight is held close to the body.

By adopting incorrect postures, you will lose your youthful appearance and the beauty of your body. In pushing, pulling, lifting or lowering objects, adopting incorrect postures can damage the spine and muscles.

Summary

Correct postures can be maintained by following the principles of biomechanics in day-to-day activities like pushing, pulling, lifting and lowering objects.

Handling objects adopting incorrect postures can damage the appearance of the body and may also result in various physical disabilities.

Exercise

1. Name three features of the correct posture for pushing an object.
2. Mention two factors that are useful to maintain the balance of the body when pulling an object.
3. Write five features of the correct posture that should be adopted when lifting an object.
4. Write three features of the correct posture that should be adopted when lowering an object from a height.

8 Let us engage in outdoor activities

Most people in society today have been adapted to a competitive as well as monotonous lifestyle. Think of a place where you would like to spend time leisurely taking some rest from your strict, dull routine. Just imagine how comfortable and relaxed you would feel when you are in some natural environment, in a forest, near a lake or a waterfall. Without engaging only in studies and being confined to the classroom, engaging in outdoor activities to gain such knowledge related to natural phenomena is called outdoor education. We agree that admirable qualities like good discipline, leadership, follower-ship, patience and ability to handle challenges effectively can be enhanced by engaging in outdoor activities in addition to classroom activities which help to produce physically and mentally healthy persons.

You gained some basic knowledge about outdoor activities when you were in Grade 10.

In this lesson we will learn further about mountaineering, jungle explorations and study of jungle crafts.

Activity

i. Make a list of outdoor activities that students can engage in.
ii. Write a list of benefits that can be gained by engaging in outdoor activities.
(Recollect what you learnt when you were in Grade 10)

Organizing outdoor activities

It is very important to plan outdoor activities following the three phases given below and the activities should be organized according to the prepared plan.

1. Pre - preparation
2. Implementation
3. End (conclusion)

Pre-preparation

Pre- preparation is essential for the successful organization of any activity.

- **Deciding on the date, time, venue, objectives, and what activities to participate in**

- **Obtaining permission**
  First, permission of the class teacher should be obtained for the outdoor activity to be organized. Then written permission should be obtained from the principal for organizing the activity and from parents giving their consent for students to participate.

  To implement the activity, permission of relevant authorities should be obtained before entering areas like forest reserves or other places as required.

  It is important to obtain the necessary permission from the Divisional Secretary, Grama Niladhari, Officer-in-Charge of the police station, Forest Rangers, and the heads of the religious institutions in the relevant areas as required and also to keep them informed of your intended activity.

- **Preparing a participant information sheet**
  It is important to prepare a participant information sheet before the activity. The following information should be included in the information sheet:
  ▸ Name of the participant
  ▸ Address
  ▸ Class
  ▸ Telephone number
  ▸ Name, address and telephone numbers of the person who should be informed in case of an emergency

- **Gaining awareness**
  It is very important that you are aware of matters relating to the activity and receive the guidance of your teacher, which will enable you to implement the programme with minimum problems. Gaining knowledge related to the following before engaging in the activity is important:
  ▸ information gathered through previous studies
  ▸ ethics
  ▸ rules and regulations
  ▸ climate and weather conditions of the area

- ▸ health and sanitary arrangements
- ▸ road signs
- ▸ first-aid
- ▸ map reading
- ▸ using the compass
- ▸ making maps
- ▸ protecting the environment with love for nature
- ▸ use of equipment
- ▸ safety precautions



Figure 8.1

- **Identifying the objectives**
  You plan to engage in outdoor activities in order to achieve one or several objectives. Clear identification of those objectives will let you achieve them successfully.

- **Deciding on the items to be taken and arranging them**
  Make it a point to take only what is necessary for you in implementing the activity. A list of items that are commonly needed given here:
  - ▸ pure water
  - ▸ food
  - ▸ clothing
  - ▸ some ropes
  - ▸ a knife
  - ▸ an electric torch
  - ▸ a compass

- a notebook, a pen or a pencil
- materials necessary for putting up a tent
- a camera
- a road map of the area
- a mobile phone
- a small radio
- a binocular



Figure 8.2

Implementing the activity

Once the preparations for the activity have been completed, it has to be implemented on the scheduled date. During the implementation of the activity, the participants have to engage in various tasks. It is important to pay attention to the following in order to carry out the tasks successfully:

- using the compass
- reading the map
- providing water
- cooking food
- pitching tent
- arranging health and sanitary facilities
- finding a safe place to spend the night
- video recording and taking photographs
- drawing pictures and taking down notes
- collecting items such as plants, stones and feathers etc.



Pitching a tent



Using the composer



Cooking

Figure 8.3

End (conclusion)

At the end of the activity, the team should hold a meeting and attention should be paid to the following:

- sharing the experiences
- examining the material collected
- identifying the difficulties faced
- discussing the remedies taken to overcome the difficulties
- discussing the weaknesses and strengths in organizing the activity
- preparing the final report



Sharing experiences



Preparing the final report

Figure 8.4

Let us study further the following activities that come under outdoor activities:

1. study of jungle crafts
2. mountaineering
3. jungle explorations

Study of Jungle crafts

When we engage in outdoor activities, we should be armed with the necessary skills to successfully overcome the challenges we confront. Identifying various environmental conditions and natural phenomena and being prepared to face those situations is especially important when participating in outdoor activities.

The objective of studying jungle crafts is to acquire the ability to identify the nature of action that should be taken to overcome the challenges of nature and to be prepared for that. This can be considered as gaining knowledge about nature including animals.

The following are some of the skills that we should develop in studying jungle crafts.

- Forecasting weather by observing animal behaviour
- Finding sources of water
- Camping
- Ability to tie different types of knots
- Utilizing equipment such as knife, axe
- Measuring the height of trees
- Measuring the width of a river
- Making a bridge
- Setting up a bonfire
- Methods of cutting down trees
- Identifying the directions by studying the position of the sun, moon, and stars
- Cooking food without using utensils
- Making fire if required
- Observing the footprints of animals and identifying them



Tying various knots



Producing fire

Figure 8.5

We should find information about the trees, animals, sources of water, mountains, caves and caverns that we come across in the natural environment while studying jungle crafts.

Challenges confronted when studying Jungle crafts

When we are in the wild, we become exposed to various hazards. Such hazards can be categorized as follows:

1. hazards related to weather
2. hazards caused by animals
3. hazards related to food
4. hazards related to water
5. confusions regarding the direction
6. diseases

Important observations in overcoming the challenges confronted in the wild

Footprints

Observing footprints is very important in dealing with the hazards confronted in the wild. Observe the footprints of several persons and observe the differences in those footprints.

Then examine the footprints of some animals. You may examine the footprints of animals such as the elephant, deer, cattle, dog, and pig. Make notes of the special features of those footprints. Draw pictures of their footprints in a notebook. Now look at the pictures you have drawn and identify the animal by studying the features of the footprint. Also study how the animals move, and the time, speed and the direction in which they have moved.



Figure 8.6 - Various footprints

Landmarks

Landmarks are very important for us to move about in the wild without facing hazardous situations. Natural features in the environment can be used as landmarks and sometimes we have to make landmarks by ourselves. Some examples for using landmarks are as follows:

- breaking a twig from a branch of a tree and hanging it by the side of the way.
- keeping some fairly big stones arranged in a particular shape
- leftover parts from what animals have eaten while they were moving about
- places where animals are couched
- crushed grass or other plants



Figure 8.7 - Places where animals lie

We study jungle crafts to protect from hazardous situations that we may encounter in the forest. The following are some of the strategies that we can adopt while we are in a forest area.

Camouflaging

if we are clearly noticeable to animals, there is greater possibility of being attacked by them. Therefore we should be camouflaged in the forest. For that we should wear clothes that have the same colour as plants and trees and the ground.

Walking cautiously

When we are inside the forest we should walk slowly and quietly taking cover behind trees and by crawling when we pass an open air stretch.

Imitating animals

Imitate animals always as much as possible. Animals can be imitated by making sounds similar to theirs and by imitating their actions.

Knowledge on food available in the forest

We need to have acquired adequate knowledge on how to find food when we are in the wild in case we run out of or run short of food supplies we carry with us. Forests usually have various kinds of food like yams, fruit, jack and breadfruit. However when you go in search of such food, you may come across poisonous foods, too. In order to refrain from consuming such poisonous food, you can select only those that are eaten by animals.

Mountaineering

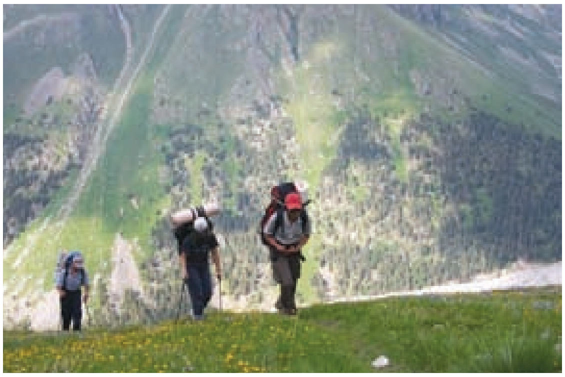


Figure 8.8 - Mountaineering

Climbing mountains which do not have roads for easy access under difficult weather conditions like hot sun, rain and wind can be called mountaineering. Mountaineering is a very good activity for strengthening self confidence. In mountaineering, it is very important that every participant acts with a deep sense of team spirit. Negligence or carelessness of one participant may create a grave danger for the whole team.

Facts to be taken into consideration in mountaineering

- Gaining understanding about the flora and fauna of the area.
- Gaining understanding about the condition of soil and rocks in the area.
- Learning the facts that the previous explorers have reported.
- Getting the participation of explorers who have experience in mountaineering.
- Gaining awareness as to how action should be taken and who should be informed of in case of an emergency.
- Arranging only the essential items so that they can be carried in a rucksack.
- Gaining full understanding and training in utilizing safety equipment.
- Refraining from engaging in unnecessary, unsafe activities.
- Respecting leadership and following orders.
- Always working with team-spirit.
- Having received training in rope climbing.
- Having developed skills in tying knots with ropes.
- Using a stick as a support for walking.

Jungle exploration



Figure 8.9 - Jungle exploration

Man who evolved gradually over the era of the hunter stepped into the agricultural era. Man in the era of the hunter lived a completely savage life in the jungle.

But today the prime objective of jungle exploration is to study the biodiversity of the relevant area. Through jungle explorations we can learn about the animals, birds, insects and reptiles living in the wild, the nature of vegetation in the area, streams, brooks and rivers flowing there, topographical features, nature of soil and the rainfall of the area.

It is important that participants in mountaineering should be in small groups and take special care about their safety. As there are dangers involved with this activity, participants should get advice from adults experienced in jungle exploration.

Facts that special attention should be drawn to in jungle explorations

- Gaining adequate understanding about the animals living in the wild.
  Having adequate knowledge about animals including snakes living in the area, their behaviour and their food varieties help a great deal in jungle exploration.
- Gaining understanding of the vegetation
  Having adequate knowledge of the types of plants, trees and creepers in the area, the edible parts of jungle vegetation is important in jungle exploration.
- Gaining awareness on dealing with an emergency.
- Providing clothes necessary to prevent snake bites and leeches.
- Refraining from making noise while staying in the forest as it could provoke animals.

- Making marks along the path used for walking and using those to find the way.
- Gaining knowledge on how to use the compass and maps.
- Gaining skills in identifying footprints of animals.
- Mapping the route used for the exploration.
- Making notes, videoing or taking photographs of places of particular significance in the forest.
- Taking safe food and water.
- Carrying only the essential items.

Activity

Write a list of benefits that you can gain by participating in outdoor activities. Add some fresh ideas in addition to what you learnt in Grade 10.

Summary

In outdoor activities, we engage in various tasks involving ourselves with the natural environment. Outdoor activities are organized under the three phases of preparation, implementation and conclusion.

In this lesson we learned about the study of jungle crafts, mountaineering and jungle explorations which come under outdoor activities.

Through the study of jungle crafts we gain knowledge about nature of animals, plants and trees.

Mountaineering is an outdoor activity which helps develop self-confidence.

The main objective of jungle exploration is to study the biodiversity.

We gain various benefits by engaging in outdoor activities and we should be careful about our safety when engaging in such activities.

Exercise

1. What are the steps you would follow in organizing an outdoor activity?
2. What are the challenges you may have to face when you go to the wild for studying jungle crafts?
3. Write eight facts that you would take into consideration when engaging in mountaineering.
4. Write five factors that should be taken into consideration in jungle explorations.

9 Let us learn about running events in athletics

Activities related to athletics can also be seen in the everyday life of people, in outdoor and in certain indoor sports activities. In athletics there are rules and regulations specific to certain sports events. There are also general rules and regulations relevant to all the events. The knowledge and the practical skills you develop by engaging in athletics will pave the way for you to live a successful and healthy life.

Recollect the classification of athletics events, the techniques and rules and regulations of race walking and running that you learnt in Grade 10.

In this lesson we will learn the general rules and regulations of athletics events and about sprinting, long distance running and hurdles. We will also engage in practical activities related to them.

General rules and regulations of athletics

There is a set of general rules and regulations common to all athletics events. There are also specific rules and regulations relevant to running, jumping and throwing events according to the classification of athletics events.

Clothing

Clothing of the participants of athletics events should fulfill the following criteria:

1. Athletes must wear clean clothing.
2. Clothing should be appropriate for the event and made of a non-transparent material.
3. Athletes must not wear clothing that could impede the view of the judges
4. Athletes' vests should have the identical colour on the front and back

Shoes

When athletes participate in athletics events, rules and regulations related to wearing of shoes are as follows:

1. Athletes may compete barefoot.
2. Athletes may wear footwear on one foot only.
3. Athletes may wear footwear on both feet.
4. The purpose of wearing shoes for competitions is to give protection and stability to the feet and get a firm grip on the ground.
5. Other than for the above, shoes must not be worn to get unfair, additional assistance (eg: shoes that have been made with springs or similar parts fixed inside should not be worn).
6. A maximum of 11 spikes could have been fixed to the shoe.

Athlete bibs

1. An athlete should wear two bibs containing the athlete's number visible on the breast and back.
2. In high jump and pole vault events, only one bib may be worn either on the breast or at the back.
3. The maximum length and width of a bib should be 24 cm and 20 cm respectively.

General rules and regulations related to the running track

1. The length of a standard running track should be 400m.
2. The running track should consist of two parallel straights which are connected with two semi-circles of which the radii are equal.
3. The width of a running lane should be 1.22 m.
4. A running track should consist of a minimum of 8 lanes.
5. In all the races up to and including 400 m, each runner should use a starting block.
6. In mixed relay events of 4 x 100 m, 4 x 200 m and 4 x 400 m, the first runner should use a starting block.
7. In running events of 800m and above that, it is compulsory to take the standing start.
8. The direction of running or walking on the track should be anticlockwise.
9. If there are many participants, preliminary rounds of the competition should be held.

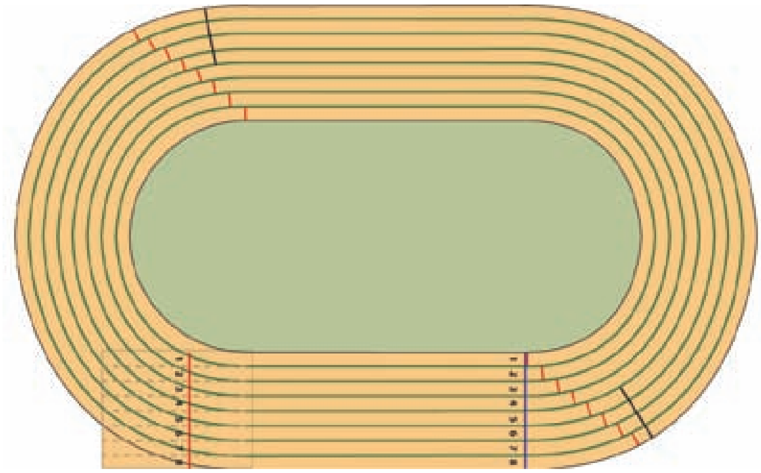


Figure 9.1 - Running track

General rules and regulations for field events (jumping / throwing events)

1. Before the beginning of the event, each athlete may have practice trials at the competition area.
2. Once a competition has begun, athletes are not permitted to use the playground or the landing area for practice purposes.
3. In all field events, except the high jump and the pole vault, where there are more than eight athletes, each athlete shall be allowed three trials and the eight athletes with the best valid performances shall be allowed three additional trials (Except for internationally recognized competitions, the number of trials for the competition may be decided at the discretion of the organizers).
4. In high jump and the pole vault three trials are given to make a particular height.

Running

Running events are classified based on the running distance. In different races, runners run at different speeds. There are accepted rules and regulations, and techniques for each race. The aim of a participant in a running race is to finish some specific distance within a minimum time period. Running speed is very important for this. There are two key factors that determine the running speed.

1. the stride length of the runner
2. the stride frequency (the number of steps made within one second)

Running speed can be increased either by increasing the stride length or by increasing the stride frequency or by increasing both those factors. However, it is important that those two factors are maintained at a moderate level.

There are two main techniques for starting the run in a running event:

1. Standing start – for running events of over 400 m.
2. Crouch start – for running events of 400 m and below 400 m
   eg : 100 m, 200 m, 400m
   4 x 100 m, 4 x 200 m, 4 x 400 m relay races
   100 m, 110 m, 400 m hurdles

According to the classification of athletics events, running events are divided into three types namely, short distance running, middle distance running and long distance running. In middle-distance running events, running takes place at a moderate speed. Unlike in sprinting, the starting speed is comparatively lower in long distance running.

A running stride consists of three phases:

1. take-off
2. flight
3. landing

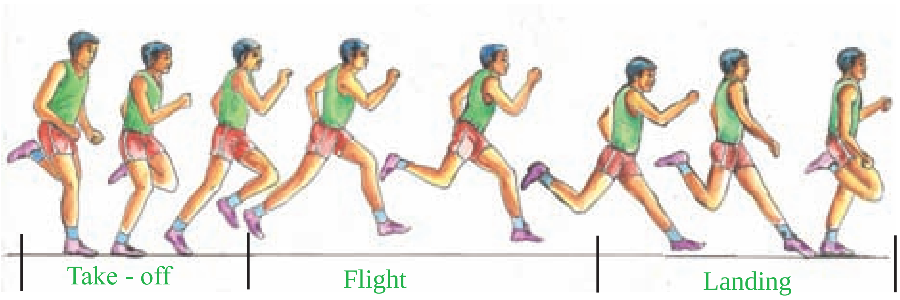


Figure 9.2

Short distance running (Sprints)

In sprint techniques, the functioning of legs, movement of hands and the position of the head and the torso are very important. As the race ends in a very short period such parts of the body function at their maximum capacity.

You have already learnt that the crouch start is used for sprints. For the crouch start there are three commands namely, "on your marks", "get set" and "go".

Sprinting technique

- In sprinting the start is very fast. Initially the body is leaned forwards and it then gradually becomes upright.
- When finishing the race the speed is slightly reduced and the body is leaned forwards.
- The hands are rotated by about 90^0 forwards and backwards around the shoulder.
- The legs rotate around the axis of the hip.
- The knees are raised higher.
- Running strides are long.

Activity

In order to practise the sprint start, come to the running posture following a signal after beginning with various postures and run forwards very fast.

Long distance running

- A standing start should be taken for running events above 400 m and above that. In the standing start only the “on you mark” and “go” (gun shot) commands are given.



Figure 9.3 - Start of long distance running

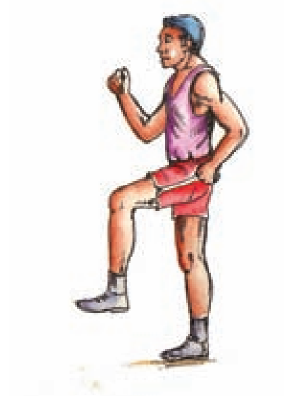
Running technique in middle-distance and long distance running

- In long distance running, the upper part of the body is kept upright while running.
- As the running speed is increased towards the end of the race, the body is leaned forwards.
- In long distance running, the running strides are short, and the knee is raised to a moderate level.
- Hand movement in long distance running is not as fast as in short distance running.
- The body functions in a relax manner rhythmically.

Running exercises

In previous lessons you have learnt about running exercises and about the benefits gained by engaging in running exercises. Let us study some more exercises that can be used to practise the running technique as well as to increase the running speed.

Table 9.1

Ankling Walking fast with very short strides so that the balls of the feet touch the ground. 	**Skipping A** Moving forwards fast so that each foot strikes the ground alternatively during skipping stride 
Skipping B Moving forwards skipping with one foot while the other foot is swung forward alternately. 	**Bounding** Exerting pressure on the ground with the supporting foot and bending the knee and walking with leaping strides. 

Hurdling



Figure 9.4

Hurdling is a fast and rhythmic technically activity and is a very interesting one of the running events in athletics. Hurdling is a short distance event. Player should run over ten hurdles in this event. Hurdling has a special significance to the field of athletics in Sri Lanka because Sri Lanka won its first ever Olympic medal when Duncan White won a place in a 400 m hurdling race.

Hurdling events are held as follows in sports competitions at national and international levels.

Men's – 110 m hurdles, 400 m hurdles
Women's – 100 m hurdles, 400 m hurdles

The ability to run a short distance very fast and to clear the hurdles applying the technique are the basic skills that a hurdler should possess.

Hurdling technique

There are two key phases of the hurdling technique

1. clearing the hurdling
2. running between hurdles

1. Clearing the hurdle

Clearing the hurdle can again be divided into three phases

A. taking off
B. clearing the hurdle
C. landing

A. Taking off

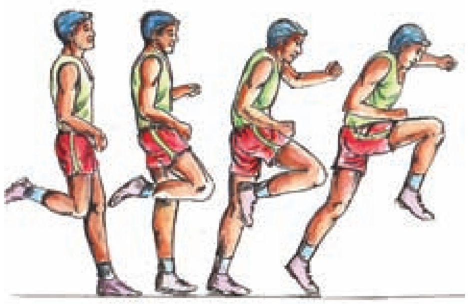


Figure 9.5

- The runner who is approaching fast gets prepared for the take-off.
- The knee and the ankle of the take-off leg are completely straight.
- The lead leg is bent fast at the knee and is raised so that the upper leg is parallel to the ground

B. clearing the hurdle

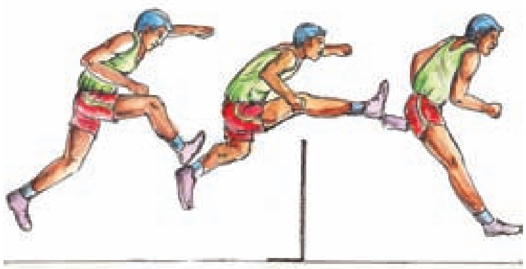


Figure 9.6

- The knee is straightened so that it is completely straight and is slightly bent over the hurdle.
- The upper body is leaned forwards.
- The trail leg is dragged sideways over the side of the hurdle.
- As the hurdle is being cleared, the thigh of the trail leg is almost parallel to the ground.

C. Landing



Figure 9.7

- Landing should be made so that the ball of the foot of the lead leg touches the ground first.

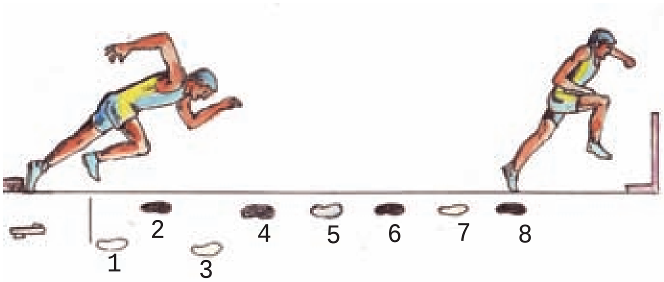


Figure 9.8

2. Running between hurdles

- In 100 m and 110 m hurdling events, the first hurdle should be reached with eight steps from the starting block.
- It is important to position leading leg on rare block of the starting block so that the first hurdle is approached with the leading leg. (This can be changed for beginners)

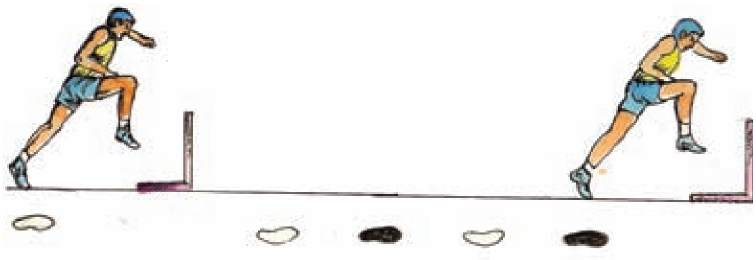


Figure 9.9

- In 100 m and 110 m hurdling events, the next hurdle should be approached with three steps.

Training exercises for hurdling

1. 

Figure 9.10

Place in a limited area of the playground some obstacles like cardboard boxes that are not very high, and run about freely jumping over the boxes from time to time.

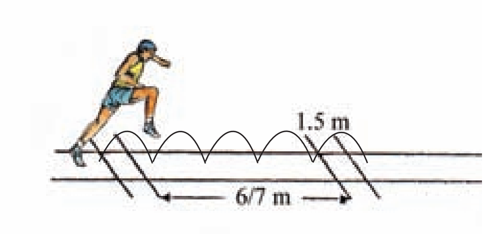
2. 

Figure 9.11

Mark some gaps on the ground as shown in the picture. Run the 7-meter gap in three steps jumping over the 1.5-metre gap.

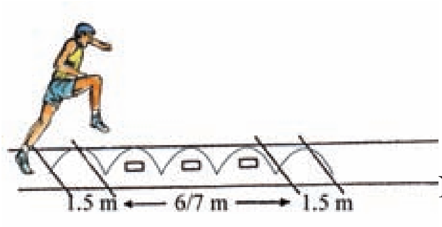
3. 

Figure 9.12

Now place some small obstacles in the 1.5m gaps and continue doing the same activity.

Some key rules and regulations of hurdling events

1. Runners should clear the hurdles in the same lanes that have been allocated to them until the end of the race.
2. While clearing the hurdle, a foot/the feet should not be taken out side of the hurdles
3. It is illegal to knock down the hurdle with hand or foot deliberately.

Summary

The general rules and regulations of athletics include rules and regulations related to clothing, shoes and bibs of athletes. In addition to them, there also are rules and regulation that are common to track and field events.

Running events are classified as short distance, middle distance and long distance races based on the running distance. The running speed is very decisive in running events. The stride length and stride frequency are the factors that determine the running speed.

The hurdling technique includes the two phases namely, clearing the hurdle and running between hurdles. Clearing the hurdle is again divided into three phases namely take-off, hurdle clearance and landing.

Athletes should engage in regular training to develop running and hurdling skills

Exercise

1. Write two general rules and regulations followed in athletics with regard to each of the following:
    - i. clothing
    - ii. shoes
    - iii. athletes' bibs
2. Write five general rules and regulations applied in running events.
3. Write two general rules and regulations applied in field events.
4. What are the two factors that affect the running speed of a runner in a running event?
5. Name the three phases of a running stride.

10 Let us cooperate with management and organizing through sports

Sports and sports management are handled with perfect combination at present. Many countries in the world have achieved victories and are accomplishing their aims of producing citizens with balanced personality through proper management of sports. For Sri Lanka to achieve such aims, the role played by the school sports managers is very important. You, too, are greatly benefited through proper management of the organization of sports activities conducted under the subject of Physical Education at school.

In previous grades, you learnt the objectives of rules and regulations in sport, the need for such rules and regulations in sport, evolution of the Olympic Games, doping in sports and the tasks involved in the organization of sports at school.

In this chapter you will learn about the roles of the manager and the followers in the organization structure of sports, how contribution is made as a sports manager towards the organization of sports activities conducted at school and also about the organization of sports tournaments.

Organizations

There are various organizations in society. Though they are given different names such as 'family, school, sports club, etc.' they can all be called 'organizations' in general despite the fact that they differ from one another in terms of aims and objectives.

An organization is "an economic or a social unit which utilizes resources effectively for the achievement of set aims and objectives".

These organizations perform different functions. There are persons appointed to carry out those functions. They have been assigned with various tasks, and a structure has been formed for the assignment of those tasks and for the performance of those functions. It is called the 'organizational structure'.

There are several features that are common to organizations. They are;

- having set aims and objectives

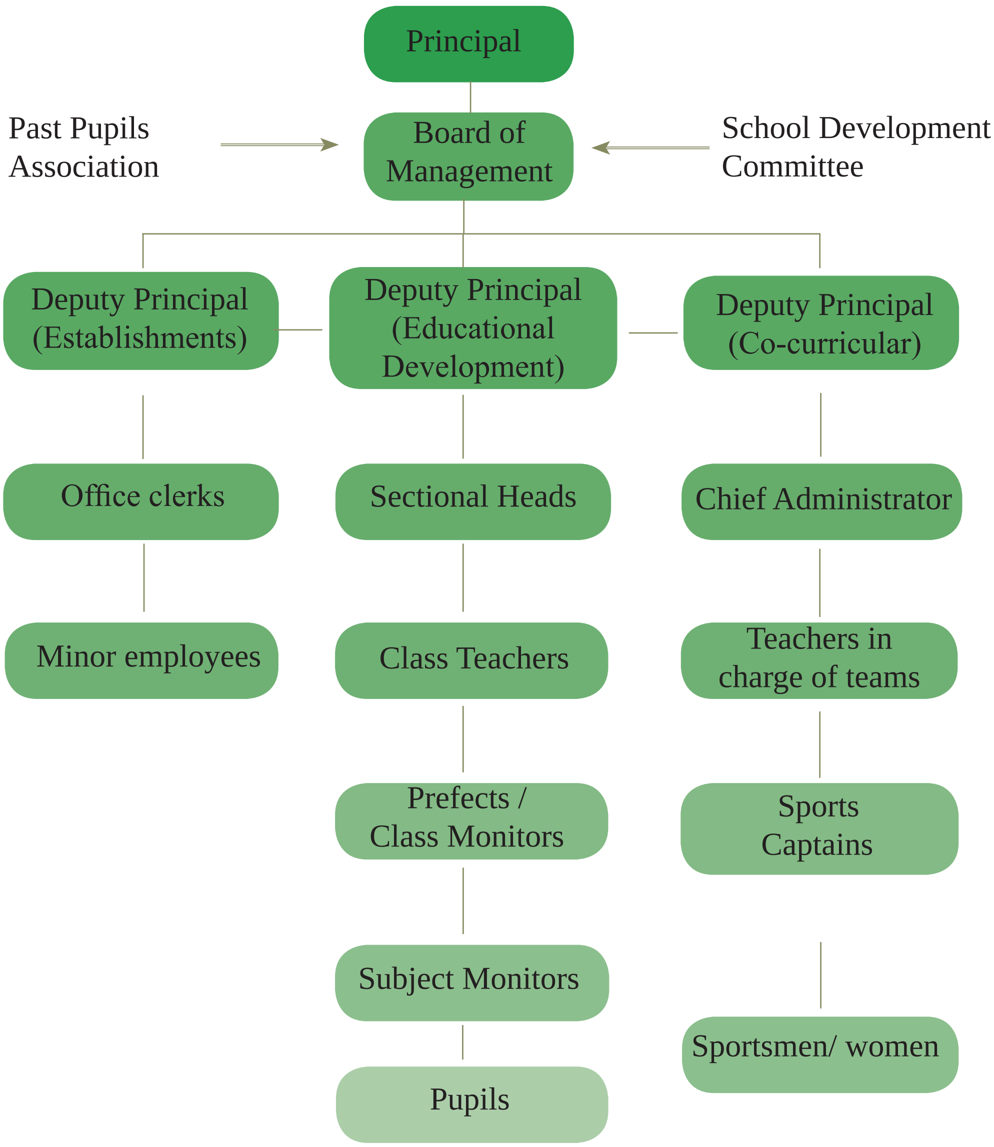
- having defined ways of (strategies for) achieving those aims and objectives.
- having persons for the implementation of those strategies.

Activity

The school you study at is an organization. What are the aims and objectives of your school? What are the strategies that have been adopted to achieve those aims and objectives? Are there Managers? Illustrate the organizational structure of your school.

Organizational Structure of a School

Diagramme 10.1



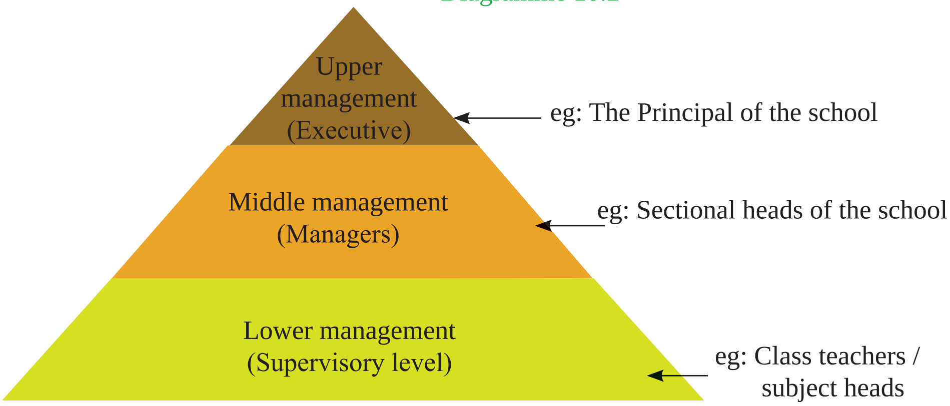
Management and follower-ship of organizations

The Manager

The person who is engaged in the process of coordinating all the resources of an organization in order to achieve the aims and objectives of that organization is called 'manager'. It is the responsibility of the manager of an organization to set aims and objectives for the organization and to formulate policies, strategies and plans to work towards the achievement of those objectives.

Generally, the management of an organization consists of three tiers.

Diagramme 10.2



- Generally, there are managers belonging to different levels of management of different fields in society.
- As far as the school education sector is concerned as a whole, the Secretary to the Ministry of Education is the chief manager and the principal of a school is in the lower management, but as far as a school is concerned, the principal is in the top management.

Qualities that a manager should possess

- Excellent skills in taking leadership
- Knowledge and skills in his/her subject area
- Good interpersonal skills
- Good communication skills
- Skilled in making judgments and in analysing
- Emotional balance and skills to handle pressure successfully
- Skilled in maintaining institutional balance
- Flexibility
- Skilled in human resource management

The Follower

One who is managed, organized, and led by the role of management is called a follower. That means a follower is a person who works cooperatively under a leader in order to achieve the set aims. When there are efficient followers, the management process continues successfully.

Qualities that a follower should possess

- Providing assistance to achieve the common goals.
- Respecting the leadership.
- Handling pressure effectively.
- Carrying out responsibilities properly.
- Maintaining healthy interpersonal relationships.
- Acting with team spirit.
- Being flexible.

The role of physical education management

It is very important that matters are handled in proper order to facilitate the development of organizations as well as that of persons. That is why people have developed a keen interest in 'management'. It is important that you, too, deal with matters very sensibly to overcome the present as well as future social challenges.

The process that includes planning, organizing, directing and handling of human and other resources efficiently and effectively for the achievement of the defined aims and objectives of a person or an organization is called 'management'.

The process of physical education management, too, should take place in accordance with the definition of 'management' that is given above. The process of planning, organizing, directing and handling of human and other resources efficiently and effectively for the achievement of the aims and objectives that are defined in terms of physical education should take place under physical education management. Management of resources is very important in physical education management.

Resource management in physical education

Resource management of an organization means obtaining resources necessary for that organization, to distribute and utilize them and to conserve them making necessary developments in order to achieve the aims and objectives of that organization.

In physical education activities the sports manager is responsible for the proper management of resources. These resources can be divided into two main categories namely, human resources and physical resources. In addition to these two, time and finances, too, should be managed as resources.

In physical education, effective management of human resources helps to provide opportunities for pupils to gain experiences necessary for the development of their skills, to receive through sports activities the exposure required for the implementation of other common programmes and to develop personality traits like skills in maintaining healthy interpersonal relationships and team spirit.

Management of physical resources in physical education includes:

- planning and identifying resources necessary for the sports section eg: play ground, sports equipment etc.
- obtaining those resources
- distribution of those resources
- maintenance and repairing

Effective management of physical resources :

- enables the use of such resources for multiple purposes.
- provides every one of the school with an opportunity to use the available resources.
- helps inculcate good attitudes related to conservation of resources.

Time and finances, too, should be managed as resources. A sports manager should have excellent skills in time and finance management. Such management skills are very important in maintaining a balance between the academic work and sports activities of the pupils.

Physical education programmes that can be managed within school

Physical education programmes that can be managed within school can be divided into three main categories.

1. Compulsory physical education programmes

- physical fitness programme
- physical fitness test
- teaching of the subject of Health and Physical Education



Figure 10.1 - Engage in physical education activities

2. Co-curricular physical education programmes

- Inter-house sports meet
- Organized training programmes and athletics training workshops conducted at school
- Sports clubs
- Athletics / physical education day
- Special sports training programmes



Figure 10.2 - Inter-house sports meet

3. Physical education programmes conducted outside school

- Inter-school competitions
- First-aid, scouting or cadets camps
- Hikes, mountain climbing programmes



Figure 10.3 - Scouting programmes

Participate without fail in some physical education programme that is conducted at school in order to enjoy the various physical, mental and social benefits it offers to you.

The following are some of the benefits you can enjoy by participating in physical education programmes conducted at school:

1. improvement of fitness including rhythm
2. development of attitudes
3. development of skills in managing stress
4. acquiring the ability to start the day actively
5. personality development
6. getting the opportunity to share experiences
7. pupils who have special talents in sports get the opportunity to further develop those talents

Participating in sports activities enables pupils to maintain a healthy body and also to engage actively in studies with a peaceful mind. It also helps the pupils to relieve the monotony and stress caused by continuous studies.

Manage your time properly so that at least an hour can be allocated every day for engaging in sports activities which helps you to maintain a good physical, mental and social balance.

For extra knowledge

The following are some facts to be taken into consideration when planning physical education activities:

- Sports activities should be designed to suit the age and the gender of the participants.
- The activities should be appropriate to the environment.
- The activities should be able to be implemented using the resources available with the organization.
- They should be in accordance with the restrictions and traditions of the school.
- The sports programmes should be designed in such a way that physical and mental needs of the pupils are addressed.
- They should be helpful in training pupils to spend their leisure effectively.
- They should be helpful in relieving the stress and pressure resulting from everyday classroom activities and also in gaining some pleasure.
- The programmes should be designed in such a way that they provide the opportunity for pupils to achieve higher levels of their talents.

Activity

Design some novel activity in which all the pupils can participate apart from the physical education programmes that have been described above.

Organizing inter-house sports competitions

Inter-house sports competitions are important in providing opportunities for pupils to develop their personality.

The inter-house sports competitions can be used to identify the talents of the pupils by providing opportunities for all the pupils of the school to participate in sports events and also to facilitate them to develop their talents. The pupils who take part in sports events, and others who possess talents in dancing, leadership skills, organizing skills and creative ability, too, get the opportunity to display their talents by organizing inter-house sports meets.

There are three main phases in the organization of a sports meet

1. organizing pre-meet activities
2. organizing activities on the day
3. organizing post-meet activities

Organizing pre-meet activities (preparation)

First the principal has a meeting with the teachers of the school and appoints the necessary committees and decides on the dates to hold the events. Then an action plan is prepared detailing the events and activities to be done each day. This action plan should be implemented under the approval and guidance of the principal.

Each house should be provided with the details of the events, the programme and the conditions for holding competitions. Each house should hold house meetings. At the house meeting, the house captains, sports captains and the other office bearers should be appointed by the house. A timetable should be displayed giving details of the dates and times allocated for selecting pupils for the events, for training activities and for issuing sports equipment to houses for practices. The houses should be informed of the date of issuing specimen application forms and the deadline for receiving applications for the competitions. Preparing the playground, informing the judges, preparing results sheets, organizing the march past, training pupils for the drill display and the school band are activities that should be done at the preparation stages.



Figure 10.4 - A band in preparation

Organizing activities on the day

This includes organizing the competitions, the events and the activities to be done on the day of the meet. It is the responsibility of the sports managers to identify the requirements of sports equipment and other materials and make them available at relevant places, prepare an action sheet containing a list of activities to be done by each committee and monitor the implementation of those activities, supervise the preparation of the playground, the flag post and the dais etc., make arrangements for seating, refreshment, awarding certificates and prizes, and to monitor the implementation of the activities related to the awards ceremony and the closing ceremony.



Figure 10.5 - Preparation of certificates and plaques

Organizing post-meet activities (follow up)

It is the responsibility of the sports managers to supervise the implementation of

the activities like returning the equipment brought to the school, sending letters thanking the relevant parties, conducting review meetings, and preparing the income and expenditure report.

Table - 10.1

Committee	Activities to be implemented
Main organizing Committee	Monitoring all the activities from the preparation to the end of the sports meet Implementing the plans Considering the needs of all the partes
Finance Committee	Making estimates of all the expenses and obtaining sufficient funds to meet those expenses
Records and Certificates Committee	Preparing all the necessary documents Preparing certificates
Refreshment Committee	Making arrangements for providing refreshment required for all the occasions from the beginning of the competitions to the end of the sportsmeet Serving refreshment

Various committees can be appointed at the discretion of the Organizing Committee and those committees can be assigned with different tasks.

It is noticed that schools hold competitions according to the traditions and cultures maintained by those schools and therefore differences can be seen in the way the opening ceremonies and closing ceremonies of different schools are conducted.

However, despite such differences, holding inter-house sports meet is especially helpful in developing the thinking ability and personal and social skills of pupils to build a balanced personality.

Activity

Write in the following table a list of activities that have to be implemented in organizing an inter-house sports meet.

Pre-preparation activities	Organizing the meet	Follow up activities

Tournaments

A series of competitions of some sport held between teams or persons in accordance with a set of accepted rules in order to select the winners is called a tournament.

Preparing the draw

The draw of a tournament should be prepared so that the concept of "fair competition" is not damaged.

There are several ways of preparing the draw.

1. Knockout tournament (Single elimination tournament)
2. League tournament
3. Combination tournament
4. Challenge tournament

Out of these four tournaments, let us study the first two.

1. Knockout tournament

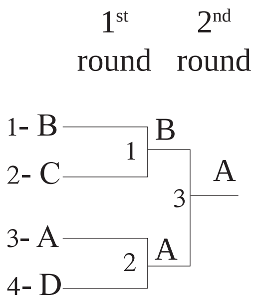
When playing a tournament according to the knockout system, the defeated competitor is removed from the tournament and therefore this method is called single elimination tournament or knockout tournament. This method is often used at school level competitions in Sri Lanka.

For easy understanding, this method has been divided into two types as follows and how the draw is prepared in each type is explained below:

I. When the number of teams is a power of two.
II. When the number of teams is not a power of two.

I. The draw of the tournament when the number of teams is a power of two.

Numbers like 2 (2^1), 4(2^2), 8(2^3), 16(2^4), and 32(2^5) are powers of two. Suppose that four teams namely A,B,C, and D take part in the tournament. When chosen by lot, team B got No. 1, team C got No.2, team A got No. 3, and team D got No. 4. (Look at the draw)



In the first round, B and C play each other and then A and D play each other. If B wins in the match between B and C, and if A wins in the match between A and D in the first round, the second round (the final round) will be played between B and A. According to this example, A is the winner.

Calculating the number of matches to be played using the formula

Number of matches = n -1 (n = Number of participating teams)

Number of participating teams = 4

n = 4

The number of matches to be played = n -1

Accordingly the number of matches = 4 - 1

= 3

II. The draw of the tournament when the number of teams is not a power of two

If the number of teams participating in the first round is not a power of two, the number of teams coming to the second round should be made a power of two. This is done by awarding 'byes' in the first round.

How byes are awarded

Byes are awarded in various ways. Let us study an example in which byes have been awarded in the bottom – top method.

Suppose that the number of teams participating in the tournament is six.

Step 1

Find the number that is the next power of two that comes after six which is the number of teams.

The next power of 2 after 6 $= 2^3$

$= 8$

Step 2

Reduce the number of teams (i.e. 6) from the next power of 2 that comes after 6 (i.e. 8).

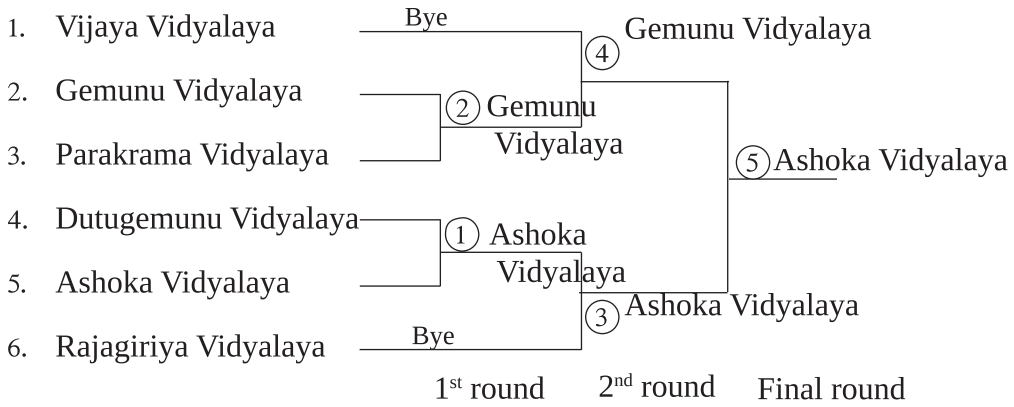
number of teams to which byes should be awarded $= 8 - 6$
$= 2$

The number of participating teams is 6 and the number of byes that should be awarded is 2.

Step 3

Select the order of teams by drawing lots between team captains. After arranging the teams in the order, award byes for two teams each from the bottom and from the top.

Diagramme 10.3



According to this example, Ashoka Vidyalaya is the winner.

When the number of participating teams is higher, competitions are held dividing the teams into quarters. Then byes can be awarded using cue-chart.

Activity

i. Prepare draws for two tournaments with 9 and 17 participating teams.

ii. Fill in the following table

No. of teams	No. of byes awarded	No. of matches	No. of rounds
20			
25			
30			
35			

Advantages and disadvantages of single elimination tournament or knockout tournament

Advantages

- As losers are removed from the tournament, the number of matches to be played is lower.
- Organizing tournaments according to this method is comparatively easier.
- The tournament can be finished within a short period of time.
- The amount of physical resources like equipment, funds and stadiums etc. required for holding the tournament is less.
- The tournament can be held with a lower number of referees.

Disadvantages

- The teams or players that lose once are left out from the tournament.
- The place that each team wins cannot be selected in the right order beginning from the first place.
- If two strong teams play each other, one team has to leave the tournament while a weaker team may go ahead.
- Sufficient opportunity is not available under this method to identify the team or player with the best skills or to judge the talents of each team or player.
- In a tournament where there are a large number of participants, the teams that win in a round will have to wait a long time until their next match is played. It dampens their enthusiasm.

2. League Tournament

Unlike in the knockout tournament, the losers are not removed from the tournament in the league method. Each team gets the opportunity to play one another.

Under league tournament the rotational method is used for pairing the teams. When the number of participating teams is an even number (eg: 2,4,6,8,…) , they can be paired easily, but when it is an odd number (eg: 3,5,7,9, …), one team is awarded 'bye' and the other teams are paired.

Calculating the number of matches based on the formula.

The number of matches played under league method $= \frac{n(n-1)}{2}$

eg:

If the number of teams participating in the tournament = 6

$n = 6$

Number of matches played $= \frac{n(n-1)}{2}$

$= \frac{6(6-1)}{2}$

$= \frac{6 \times 5}{2}$

$= 15$

For easy study, how the draw is prepared for league tournament has been divided into two.

I. When the number of participating teams is an even number.

II. When the number of participating teams is an odd number.

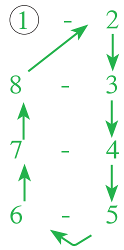
In the draw the teams can be rotated either clockwise or anti-clockwise, but number 1 is kept stable.

I. Preparing the draw when the number of participating teams is an even number

Here, number 1 has been kept stable. The draw has been prepared by rotating the numbers of the other teams from the second round onwards.

Round 1		
①	-	2
8	-	3
7	-	4
6	-	5

Rotational change of match numbers



Round 2		
①	-	8
7	-	2
6	-	3
5	-	4

Round 3		
①	-	7
6	-	8
5	-	2
4	-	3

Round 4		
①	-	6
5	-	7
4	-	8
3	-	2

Round 5		
①	-	5
4	-	6
3	-	7
2	-	8

Round 6		
①	-	4
3	-	5
2	-	6
8	-	7

Round 7		
①	-	3
2	-	4
8	-	5
7	-	6

The teams that play each other in the first round

1 and 2
8 and 3
7 and 4
6 and 5

The teams that play each other in the second round

1 and 8
7 and 2
6 and 3
5 and 4

The two teams to play each other in each round is decided upon in this way.

The number of participating teams $= 8 \ (n = 8)$

The number of matches $= \dfrac{n(n-1)}{2}$

$$= \frac{8(8-1)}{2}$$

$$= \frac{8 \times 7}{2}$$

$$= \frac{56}{2}$$

The number of matches played $= 28$

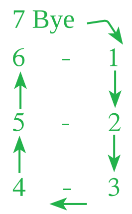
II. Preparing the draw when the number of participating teams is an odd number

When the number of participating teams is an odd number, one team is awarded a bye in one round. After one team has been awarded a bye, other teams are paired. The numbers of the teams can be rotated either clockwise or anti clockwise.

In the following example, the number of participating teams is 7 and the numbers have been rotated clockwise from the second round onwards.

Round 1		
7 Bye		
6	-	1
5	-	2
4	-	3

Rotational change of match numbers



Round 2		
6 Bye		
5	-	7
4	-	1
3	-	2

Round 3		
5 Bye		
4	-	6
3	-	7
2	-	1

Round 4		
4 Bye		
3	-	5
2	-	6
1	-	7

Round 5		
3 Bye		
2	-	4
1	-	5
7	-	6

Round 6		
2 Bye		
1	-	3
7	-	4
6	-	5

Round 7		
1 Bye		
7	-	2
6	-	3
5	-	4

The teams that play each other in the first round

6 and 1
5 and 2
4 and 3

The teams that play each other in the second round

5 and 7
4 and 1
3 and 2

The number of matches $= \frac{n(n-1)}{2}$

$= \frac{7(7-1)}{2}$

$= \frac{7 \times 6}{2}$

$= \frac{42}{2}$

The number of matches played $= 21$

The following method can be adopted in this tournament to select winners:

The team that wins the match gets 2 points.
If the match ends in a draw, both teams get 1 point each
The team that loses the match gets '0' points.
The points that each team gets in all the matches are added together and the winner of the tournament is selected based on the total number of points each team has obtained.

Advantages and disadvantages of the league tournament

Advantages

- Out of the participating teams, the best team can be selected.
- As each team has to play the other teams many times, the participants get the opportunity to improve their talents.
- All the participating teams can be ranked according to their talents.
- Teams can remain in the tournament despite been defeated.

Disadvantages

- Organizing the tournament is a little difficult because the number of matches to be played is higher.
- As the number of matches are high, more physical resources like funds, playgrounds, and equipment are needed.
- More judges are needed.
- It takes a long time to complete all the matches.
- Teams that suffer continuous defeats may get discouraged.

Let us compare the advantages and disadvantages of knockout tournaments and league tournaments

Table - 10.2

Feature	Knockout tournament	League tournament
Time taken for the tournament	shorter	longer
Organizing activities	Easier	A little difficult
Finances for organizing	Low	High
Possibility of selecting the best winner	Low	High
Obtaining necessary physical resources (playground / equipment).	Simple	Complicated
Finding judges	Easier	Difficult
Ordering teams according to performance	Difficult	Easier
Developing talents from match to match	Difficult	Easier

Summary

Management and follower-ship are considered important aspects in any organization. Both managers and followers should possess a number of qualities.

In physical education activities, too, physical and human resources, finances and time should be managed. Various benefits can be gained through the management of resources in this manner.

Physical education activities managed at school are divided into three main categories as compulsory physical education programmes, co-curricular physical education programmes, and physical education programmes conducted outside school. These programmes which benefit pupils include physical fitness programme, inter-house sports meet, and sports and physical education days.

When organizing inter-house sports competitions, the organizing activities should be managed as pre organizing activities, organizing the meet and organizing post-meet activities.

A series of competitions held in accordance with a set of accepted rules and regulations for the selection of winners of some sport are called a tournament.

When playing a tournament, the draw is prepared in several ways. Out of those methods, knockout tournament and league tournament are two commonly used methods in sports competitions.

Exercise

1. Write the common features that organizations generally share.
2. Write four qualities that a manager and a follower each should posses.
3. Write five benefits of resource management in physical education.
4. Write six physical education activities conducted at your school.
5. Write five benefits you gain by participating in the physical education programmes conducted at your school.
6. Write the three main phases of organizing an inter-house sports meet.
7. Prepare the draw for 10 teams under the knockout tournament and under the league tournament.

11 Let us consume nutritious food for a healthy life

Energy required for the existence of all living beings, their development and protection from diseases is provided by food. For a healthy life it is important to prepare meals with high nutritional value and also to ensure that food does not cause any danger or harm to the body.

Over the past several years you would have learnt many facts regarding the nutrients in food, nutritional problems and how to minimize these problems.

In this lesson you will learn about food safety, food spoilage, adulteration of food, food poisoning and how to protect the nutritional value of food and select food items suitable for consumption.

Food safety

Food safety is a scientific discipline describing handling, preparation and storage of food, in ways that prevent contamination and food-born illness.

Factors that affect food safety

1.Biological factors
Micro organisms present in food that are harmful to the body, belong to this category.
eg : bacteria, fungi

Micro organisms spoil food and emit toxins, which are usually harmful to man.

2.Chemical factors
These include residual chemical substances added to food at various stages.

eg: Prior to harvesting – pesticides
After harvesting – chemical substances added to ripen food and for food preservation

If vegetables and fruits are not washed well prior to consumption residual agro chemicals may enter the body. Long term deposition of such substances may give rise to diseases like cancers and kidney diseases.

The Ministry of Agriculture recommends that the harvest should not be gathered until two to three weeks have passed since the last use of agrochemicals.

3.Physical factors

These include substances such as stones and sand, which can contaminate food during transport, storage and preparation.

Numerous diseases can occur due to one or more factors related to food safety.

eg: spoilt food can give rise to vomiting and diarrhoea

Instances where action should be taken to ensure food safety

1. Manufacture of food

Within the farm land:

- Adding pesticides according to recommended standards
- Use of natural pest control methods (eg Margosa juice)



Figure 11.1 - Ensuring food safety within farmland

- Use of organic fertilizer
- Ensuring cleanliness of farming equipment and farmland

Within the factory:

- Ensuring cleanliness of raw ingredients
- Ensuring cleanliness of the manufacturing environment
- Ensuring cleanliness of the equipment used in the manufacturing process and the interior of the factory
- Maintaining personal hygiene of staff members

- The use of recommended artificial flavours and dyes in recommended quantities during manufacture



Figure 11.2 - Ensuring food safety within factories

2. Transport of food

- Use of wooden boxes and plastic baskets to prevent bruises and scratches
- Avoid stacking boxes one on top of the other beyond the available space.
- Use appropriate temperature settings to suit the food items. Eg: milk products should be transported maintaining the ideal temperature
- Use covers to prevent contamination.
- Use natural protective measures as much as possible instead of artificial chemicals to prevent food spoilage during transport.



Figure 11.3 - Transport ensuring food safety

3. Storage of food

- Arrange items on the shelf according to their date of expiry and place the items with early dates of expiration in front.
- Use measures to prevent damage by insects and other animals such as rats, cockroaches, weevils and termites.
- Maintain the appropriate temperature within the stores according to the relevant food items.
- Correct use of refrigerators and deep freezers.
    - ▸ Food items should be stored in appropriate locations in the fridge

- Food that requires refrigeration or deep freezing should be kept at the required temperature throughout 24 hours. The refrigerator should not be switched off during the night.
- Food and beverages should not be stored together with substances such as toxic materials, medication, aromatics etc.
- Meat, fish and ice cream should not be stored together



1. Meat and fish which require deep freezing
2. Butter, margarine
3. Vegetables
4. Bottles

Figure 11.4 – The manner in which food should be stored in a fridge at home

4. Preparation of food



Figure 11.5 - Preparing food ensuring safety

- Avoid using food which has been damaged or consumed by animals
- Avoid using spoilt or mouldy food
- Keep pets away from the area in which food is prepared
- Wash hands well before preparing food
- Clean green leafy vegetables well, soak in salt water for some time and then use
- Scrub and wash the outer skin of fruits well

- Wash eggs before breaking them as the shell may carry bacteria
  eg : salmonella
- Cut fruits and vegetables just before cooking (to prevent browning and loss of vitamins)
- Avoid repeated reuse of oil for frying food
- Use clean bowls and correct methods of cooking
  eg: keep the lid open when boiling Manioc

5. Consumption of food

- Keep food covered until consumption
- Avoid use of metal, using clay or glass bowls and wooden or plastic spoons to serve food containing vinegar, as vinegar which contains acid will react with metal and form harmful substances.
- Avoid consumption of food such as potatoes which have become green in colour and manioc which has been exposed to air
- Avoid use of bruised or swollen tinned or packet food



Figure 11.6 - Covering food

Food Spoilage

Food spoilage is the presence of any substance in food, which make it unsuitable for consumption.

Causes of food spoilage

1. Action of micro-organisms
   eg: mould growing on food
2. Action of other animals
   eg: rats consuming part of the food
3. Interactions between food and environment
   eg: browning, oil rancidity

Ways of recognizing spoilt food

1. Foul smell
2. Change in colour
3. Change in texture
4. Change in taste

Negative outcomes of food spoilage

1. Increase in incidence of disease
   eg: vomiting, diarrhoea
2. Wastage of food
3. Economic loss
   eg: reduction in income due to loss of crops
4. Reduction in quality of food
   eg: reduced nutritional value in food due to change in chemical composition of proteins and other elements following their breakdown.

Activity

Observe the following food items after they have been kept outside for several days and they have become spoilt. Describe your findings on how their colour, texture, shape and smell have changed.

1. Carrots
2. Papaw
3. Potatoes
4. Bread
5. Rice
6. Plantains

Food Adulteration

Food adulteration is any means by which the quality of food is reduced.

Food adulteration is done in many ways. Several examples are given below.

- Addition of numerous chemicals to food

- Addition of papaw seeds to pepper
- Addition of melamine to milk powder
- Addition of artificial dyes to tea leaves
- Addition of wheat flour, rice flour, corn flour, brick powder, rice chaff, cattle feed and wood shavings to adulterate chili powder, saffron and pepper
- Addition of manioc flour to adulterate corn flour

Problems arising due to food adulteration

1. Negative impact on health

Use of adulterated food can give rise to diseases as well as discomfort.
eg: Tartrazine, which is added to cordials, can cause poor sleep at night.

2. Loss of nutrients

Reduction in the amount of nutrients received due to addition of other substances to food.

eg: The nutritional requirement which one expects to fulfil by drinking a glass of milk, cannot be achieved when milk is adulterated with water.
Iodine deficiencies occur when non-iodized salt is labelled as iodized salt and sold in the market.

3. Economic losses

There is a drop in sales when people suspect adulteration and avoid consuming food from these places. Losses can occur even due to legal action and banning of products. Furthermore as people contract diseases due to food adulteration the expenses borne by the government for medication and health services increase.

Activity

Make a list of methods used in adulteration of different food groups including vegetables, fruits, condiments, milk, fish and meat.

Methods of identifying adulterated food

Chemical and physical methods are used to identify food adulteration.

According to the colour, shape, smell and texture the adulterant can be identified.

Simple methods in identifying food adulteration are mentioned below.

1. Sieve (filter) - shards of glass, pieces of iron, metal, plastic, wood, stones, sand, cigarette butts can be separated and identified by this method. In a similar manner different parts of plants and insects such as cockroaches and weevils can be separated from food.

2. Smell - a strong malodour is emitted when a chemical such as formalin is added.
There is a difference in smell between coffee which is unadulterated and which is mixed with flour.

3. Shape / colour - When formalin is added to fish its red colour gives way to a more pale appearance.

Food Poisoning

Food poisoning is defined as the occurrence of an illness due to a toxic substance in food entering the body with food or water.

It can cause the following clinical features, which include abdominal pain, dizziness, vomiting, diarrhoea and fever.

Food poisoning occurs due to substances naturally found in food, as well as due to other substances incorporated into food during cultivation, manufacture and preparation.

Instances where toxic substances get incorporated into food

1. Food which contains naturally occurring chemicals toxins
   eg: cassava, cabbage, some green leafy vegetables

2. Toxic substances which arise due to environmental factors
   eg: potatoes when exposed to sunlight produce a toxic substance called solanine and turn green in colour

3. Toxins produced by micro-organisms that grow on food
   eg: black mould which grows on peanuts

4. Insecticides and pesticides used in cultivation becoming toxic

5. Toxic substances produced during cooking

   eg: When pickles are prepared in aluminium dishes the dilute acetic acid in vinegar dissolves the aluminium and produces toxic substances.

   When coffee, meat and potato slices are charred toxic substances and a bitter taste will be produced.

   Reuse of the same oil repeatedly for frying can produce harmful chemicals.



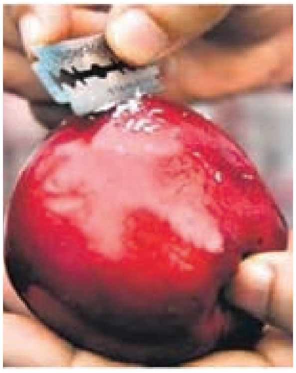


Figure 11.7 - Occasions when poisons enter food

Causes of food poisoning

1. Micro-organisms such as bacteria and viruses

2. Toxins

Chemical substances released by bacteria during their metabolic activities are known as toxins. They could be present in food and cause food poisoning.

> Cooking at an adequate temperature will destroy toxic bacteria as well as the toxins produced by them. Heating for 1-2 minutes is sufficient to destroy the toxic bacteria. However to destroy their toxins the food must be cooked at a temperature exceeding 60 ^{0}C for approximately 30 minutes.

3. Chemicals

All food items are made of chemical constituents and our bodies also contain numerous chemicals. However, the chemicals, which give rise to food poisoning, do not naturally occur in those foods. These chemicals may have been included due

to accidental contamination or as an additive to obtain the required taste, smell or colour or as a preservative.

Soaking in water helps to remove the natural toxins of cassava and soy-beans.

Food Allergies

Consumption of some food items can give rise to clinical features such as itching, urticarial rash, vomiting and faintishness. If this occurs as an abnormal reaction mounted by the body's immune system against that food item, it is known as a food allergy. Symptoms of allergy can occur with the consumption of any type of food. The same food item will affect different people in a different manner. A food item which causes an allergy in one person, may not do so in another.

Causes of food allergies

1. Special ingredients in food

The constituents of some food either acting directly or by stimulating other reactions in the body can give rise to clinical features.

eg: wine, cheese, yeast extract

2. Chemicals which are added for food preservation

The body gives rise to numerous reactions against these chemical substances.

eg: sulphur dioxide and sulphide

3. Difficulty in digesting some food substances

Some individuals suffer from lactose intolerance. The ease with which infants and young children digest milk products is lost in adulthood.

Clinical features of allergies

- Itching
- Urticarial rash
- Warmth at the site of allergy
- Red eyes
- Running nose



Figure 11.8 - Rash

As this condition can be fatal it is important to identify food that can cause allergies early on and avoid their use, as well as obtaining medical advice when necessary.

Food that commonly cause allergies

- Peanuts
- Prawns, crabs
- Milk
- Types of fish
- Eggs
- Chocolate
- Pork, bacon
- Preservatives and dyes
- Gluten proteins (corn, rye, barley)
- Tomatoes
- Pineapple

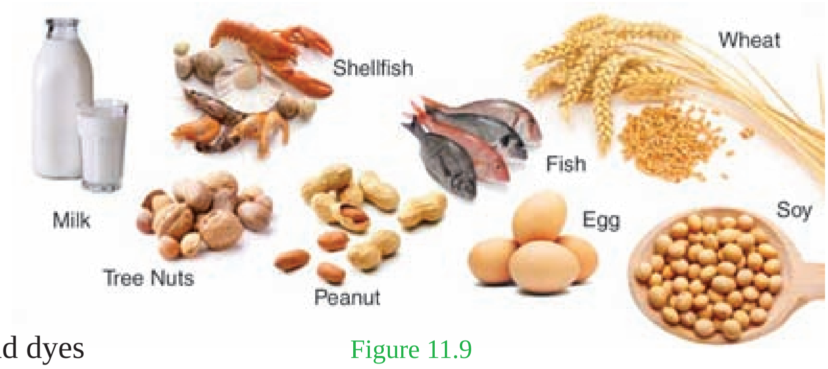


Figure 11.9

Steps to be taken to prevent allergies

- Always check the food labels to identify any substances that you may be allergic to (especially with regard to packet, tin and pre-prepared food).
- When consuming food from outside find out for certain if any allergens have been used in preparation.
- If you have suffered from a serious allergic reaction always wear an allergy bracelet or keep with you a document indicating the allergy.
- When obtaining medication from a doctor disclose any previous allergies especially prior to receiving vaccines.
- Inform all family members regarding any allergies that a family member has so that they can inform a doctor in an emergency.
- If a child suffers from allergies his or her carers, teachers, parents of friends and any adults who are in regular close contact should be informed of this. They should also be informed of the steps witch need to be taken during an allergic reaction.

Let us protect the nutritional value of food

The nutritional value must be preserved to obtain the nutrients that are necessary for the body and to prevent nutritional deficiencies.

Nutrients may be destroyed in several ways during the process from food manufacture to consumption. Therefore it is necessary to take steps to improve and protect the nutritional value of food.

Activity

Complete the following table with methods of protecting and enhancing the nutritional value of food during food preparation after discussing with adults.

Methods to protect the nutritional value	Methods to improve the nutritional value

To protect the nutritional value of food attempt to do the following

- When preparing green leafy vegetables first prepare the onions and coconut and then add the freshly cut green leafy vegetables. Then cook on a low heat for a short period so that the leaves do not discolour. This will help to preserve the nutritional value.
- Cooking meals in the shortest possible time will protect the colour, nutrient value and taste. Pressure cookers and microwave ovens can be used for this purpose.
- As calcium can reduce iron absorption, avoid cooking foods rich in calcium and iron together.
- Obtain different nutrients in the same meal by cooking several types of food together

eg: add leaves of drumsticks when cooking rice
mixed green leaf salad
hath maluwa
soups



Figure 11.10 -Varieties of soup

- Add condiments to improve the taste and give a medicinal value to the meal
- Additional nutrients can be obtained by using fortified food
  eg: Iodized salt
  Vitamin A fortified oil
- To fulfil the amino acid requirement consume pulses and grains together.
- Increase iron absorption by adding lime to food. Add lime juice to a cooked meal once it cools down. If not the heat will destroy vitamin C in lime juice.
- To increase the iron content in the food, add Maldives fish.

Activity

Gather information about the medicinal properties of cinnamon, garlic, ginger and saffron, which are condiments used to improve the flavour of food and make a small booklet.



For extra knowledge

Let us consume food suitable for a healthy life

Food is an essential requirement for the existence of all living being. To lead a healthy life free of communicable and non-communicable diseases, it is important to select suitable food.

Many types of food are found in the market

Natural food

Natural food includes food that has had minimal preparation to preserve its natural quality. They do not contain artificial flavours, dyes or aromatics and are healthier than pre prepared food. Natural food contains a lot of antioxidants and therefore helps to protect from diseases such as cancer. In addition they contain a large amount of fibre. Even natural food can have an less favourable effect on the body in instances such as cutting vegetables long before cooking and use of chemical fertilizers in place of organic fertilizers.



Figure 11.11

Processed food

Processed food includes food that has been prepared in a manner easy to use or to increase shelf life. Additives are commonly used for flavour, colour and aroma. These food have high calorie content and less fibre. Therefore by consuming these food the risk of contracting diseases increases.



Figure 11.12

Fast food and Junk food



Figure 11.13

Food that is made in a manner that enables it to be prepared for consumption over a short period of time is known as instant food. These can be seen in several forms.

- Dried food
  Food that can be consumed after adding water.
  eg: tea, coffee, milk powder, soups

- Food that can be consumed after adding other ingredients and a short cooking process.
  eg: noodles

Some types of fast food are suitable according to health standards while others are not. Therefore it is important to be vigilant about the ingredients of these food items when selecting them.

Food, which is high in energy, sugar and oil content and low in other nutrients, are unhealthy and are defined as junk food.

Therefore even though fast food has the advantage of saving time and provides ease in cooking you must be intelligent enough to avoid what is unhealthy among these food and select only healthy food.



Activity

Categorize the food available in the market or cafeteria according to the above mentioned categories.

Summary

For a healthy life it is important to select nutritious food and consume it in a manner which ensures food safety.

Therefore you must be vigilant about food safety.

Physical, chemical and biological factors affect food safety.

We must pay attention to food safety during the stages of manufacture, transport, storage and consumption.

Food spoilage, adulteration, food poisoning and food allergies can be a threat to health during food consumption.

Different methods can be used to protect and improve the nutritional value of food.

Exercise

1. What is food safety?
2. Name the factors that affect food safety and give one example each.
3. What are the instances where you must be cautious about food safety?
4. Describe three steps that must be taken to ensure food safety during storage.
5. Describe five facts that must be taken into account to ensure food safety during preparation of food.
6. Write three adverse outcomes of food spoilage.
7. Describe three methods of identifying food adulteration.
8. Name three factors that affect food poisoning.
9. Describe five steps that you can take to prevent food allergies
10. Describe five steps that can be taken to protect and improve the nutritional value of food.

12 Let us learn about jumping and throwing events in athletics

Under the classification of athletics events long jump and triple jump can be identified as horizontal jumps while high jump and pole vault come under vertical jumps. The shot put, the discus, the javelin and the hammer are the throwing events in athletics.

Out of these events, we learnt about long jump, high jump, throwing the shot put, and the discus in grade 10.

In this lesson we will learn about triple jump and throwing the javelin and engage in practical activities related to those two events.

Triple jump

Triple jump is a horizontal jump among athletics events. A great deal of energy and tremendous momentum are needed for triple jump that consists of three jumps. It is essential that a speed that can be controlled when reaching the take-off board is maintained while the speed should not be allowed to be reduced in all the three jumps.

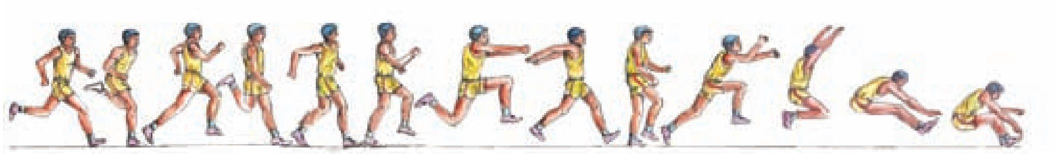


Figure 12.1 - Triple jump

Triple jump, which consists of three jumping phases namely, hop, step and jump, has altogether five phases as a whole.

1. Approach run
2. Hop
3. Step
4. Jump
5. Landing

In triple jump, the second take-off should be made using the same foot that was used for the first take-off while the third take-off should be made with the leg opposite to that. Finally the landing should be made with both legs.

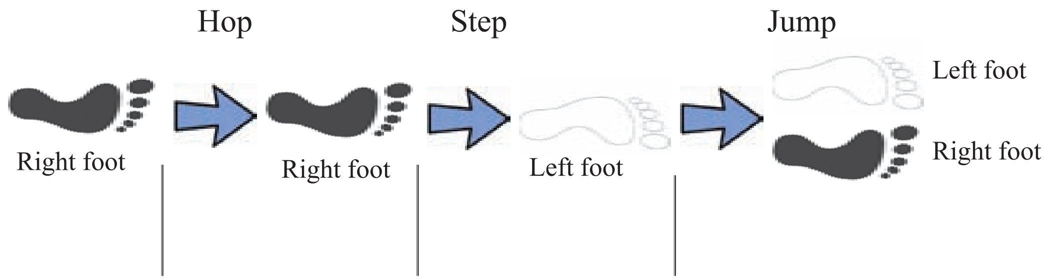


Figure 12.2 – Taking off on the right foot

Let us study the footwork of an athlete who takes off on the right leg.

Approach run



Figure 12.3 - Approach run

- The distance that is needed for the approach run varies from athlete to athlete. Beginners may use about ten steps while expert, trained athletes usually use about 17 – 20 steps.

- During the approach run, the body should be kept relaxed and straight and the running should be done raising the knee upwards.

Hop (the first jump)



Figure 12.4 - Hop

- The foot should be placed on the take-off board and the take-off should be made exerting pressure on the board.
- Unlike in the long jump, the distance of the first jump of the triple jump should not be made as long as possible.
- The take-off leg should be extended forwards.
- Balance of the body should be maintained.
- The two arms should swung backwards.
- At this position the take-off leg is completely straightened.

Step (Second jump)

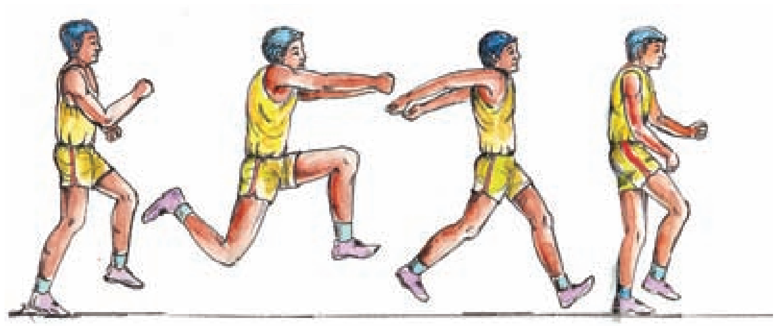


Figure 12.5 - Step

- At the step phase, take-off should be made using the same foot that was used for the 'hop'.
- Hands should be swung well.
- In the case of a right leg dominant athlete, the take-off is made by pressing the right foot against the ground.
- The left leg of the athlete is further raised.
- Then the left foot is lowered and the landing is done with the left foot.

Jump



Figure 12.6 - Jump

- At the third jump phase, the body of the athlete should be raised.
- The thigh of the right leg reaches a level that is parallel to the ground.
- At the flight phase, the hang or the sail technique is used.
- Towards the end of the flight phase, the body is prepared for the landing.
- The upper body is leaned forwards and the two legs are straightened and extended forwards. The two hands are extended forwards.

Landing

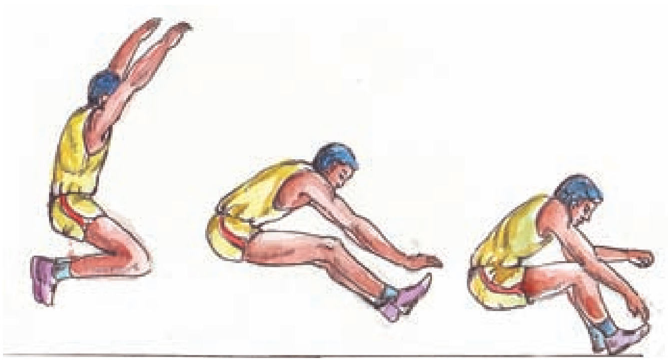


Figure 12.7 - Landing

- The legs that have been straightened are bent at the knees as the feet touch the ground.
- The athlete moves forwards in a sitting posture.
- The hands should be rotated forwards very fast.

The triple jump runway and landing pit

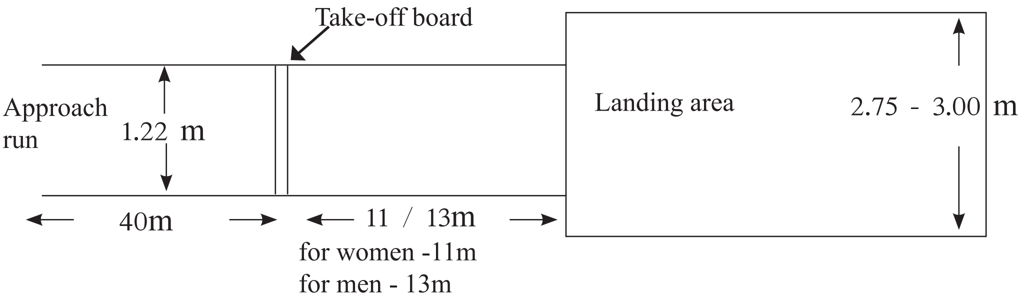


Figure 12.8 - Triple jump runway and landing pit

Training exercises for triple jump



Figure 12.9 - Training exercises

1.

- Place in some limited area a few cardboard boxes or similar objects that are not very high and that do not pose any danger, and run about the area freely jumping over those obstacles.
- When jumping over the obstacles the landing should be done with the same foot that was used to make the take-off.

2. Mark some area on the ground and move about in that area by jumping forwards keeping to the hop, step and jump order.

3. Mark a frame of lines and practice the three phases of the triple jump, hop, step and jump.

Rules and regulations of triple jump

- The triple jump should consist of the three phases hop, step and jump consecutively.
- At the hop phase, the landing should be made with the same foot that was used for the take-off and at the step phase landing should be made with the opposite foot and the same foot should be used for the take-off for the jump.
- If the free leg touches the ground during jump, it is not considered a fowl jump
- In addition to the rules and regulations given above, the rules and regulations for long jump are applied to the triple jump, too.

Javelin throw

When you were in grade 10 you learnt about the shot put and the discus which comes under field events according to the classification of athletics.

Javelin throw, too, comes under throwing events. Out of the equipment used for putting and throwing events, javelin is a piece of comparatively lower-weight equipment. The javelin is thrown by using the power that is gained by running.

As the shot put, throwing the discus and the javelin are events that involve dangers. Therefore training of those events and holding competitions should be done only under the supervision of teachers.

Javelin throw technique

Javelin throw technique can be divided into 7 phases:
1. preparation
2. approach run
3. pulling the javelin backwards
4. crossover
5. power position
6. delivery
7. recovery (Follow through)

1. Preparation



Figure 12.10 - Preparation

- The javelin thrower should stand facing the direction in which the javelin is to be thrown.
- The javelin should be held over the shoulder just above the ear so that the javelin remains parallel to the ground.
- The elbow of the hand in which the javelin is held should be directed towards the front.

2. Approach run

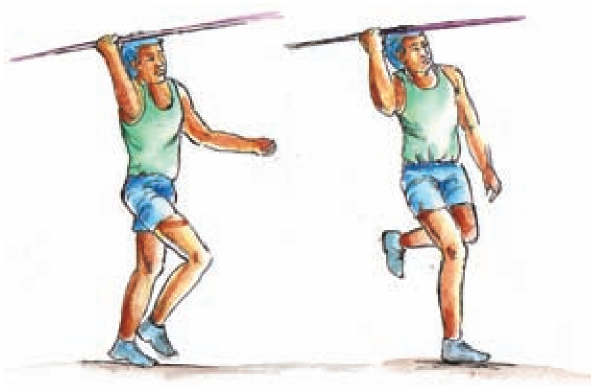


Figure 12.11 - Approach run

- The thrower runs rhythmically carrying the javelin in order to gain initial momentum.
- Javelin throwers may run about 13 – 19 steps for this while beginners may run about 6 – 12 steps.

3. Pulling the javelin backwards



Figure 12.12 - Pulling the javelin backwards

- With the first of the last five steps of the approach run, the thrower begins to pull the hand in which the javelin is held backwards behind the shoulder.
- At the third of the last five steps, the javelin is completely pulled backwards.
- The javelin that is pulled backwards is held inclined with the head.

4. Crossover



Figure 12.13 - Crossover

- The crossover is done at the penultimate step. (last four steps)
- The hand in which the javelin is held is straightened
- The foot corresponding to the hand in which the javelin is held is moved forwards with a long stride after the crossover. (according to the given picture, the right foot)
- The left foot is moved forwards once again.

5. Power position



Figure 12.14 - Power position

- When the fourth step ends the power position starts.
- At the power position the body is leaned a little backwards.
- The javelin is held in the right hand and the left leg is straightened well towards the front.

6. Delivery

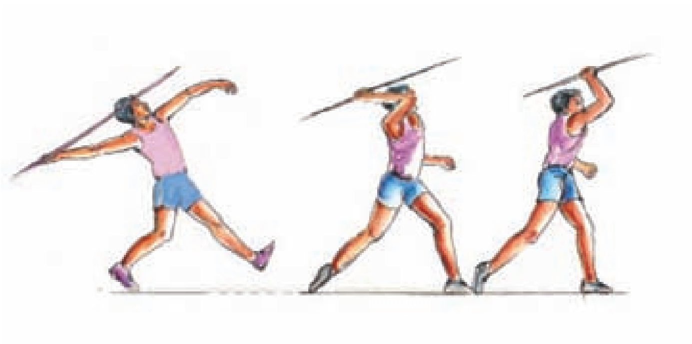


Figure 12.15 - Delivery

- The javelin is launched from over the head so that the point of the javelin is raised.
- The hip is turned forwards vigorously.
- The front foot is straightened at the knee.
- The javelin is launched by pulling forwards and upwards the elbow of the hand holding the javelin.
- When the javelin is released, the back of the thrower is bent like a bow as shown in figure 12.15

7. Recovery (Follow through)



Figure 12.16 - Follow through

- After the javelin has been thrown, the right foot is put in the front and the thrower's speed is controlled.
- The upper body is bent forwards and the body balance is maintained.

Exercises for practicing javelin throw

1.



Figure 12.17

Throw to a distance from over the head a light ball such as a tennis ball.

2.

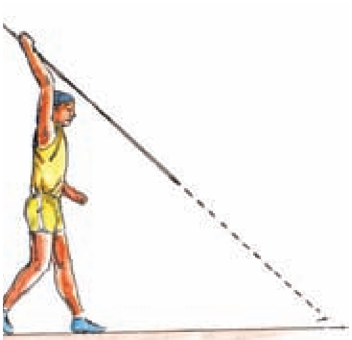


Figure 12.18

Pull the javelin backwards over the head and throw it hard onto the ground so that the point of the javelin hits the ground about 3 – 4 metres ahead.

3. Throw the javelin staying at the power position.
4. Practise throwing the javelin following the last three phases of the javelin throw technique described above.

In addition to these, do more javelin throw training exercises with the help of your teacher.

The field for javelin throw

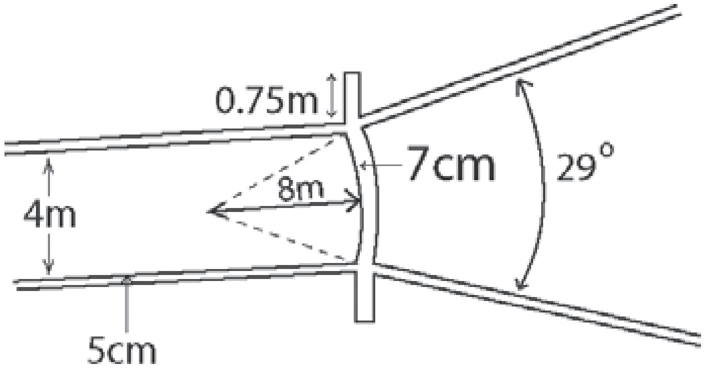


Figure 12.19 - The field for javelin throw

- The minimum distance of the javelin throw runway should be 30 metres.
- The angle between the sector lines should be 29^0.

Age-wise weight of the javelin used in all island school athletics competitions in Sri Lanka

Table 12.1

Age limit	Boys	Girls
Under 16 years	600g	500g
Under 18 years	700g	500g
Under 20 years	800g	600g

(New values introduced in circular 2016/34)



Activity

Learn from your teacher the weights of the javelin used in international competitions and tabulate them.

Some rules and regulations of javelin throw

1. The javelin should be held from the grip with single hand.
2. The javelin should be thrown over the shoulder and above the forearm. Chucking or throwing the javelin outside the standard technique is not allowed.
3. The metal point of the javelin should hit the ground first before any other part of the javelin touches the ground.
4. After the competition has started, the playground and the sector where the javelin lands are not allowed to be used for training purposes.
5. The javelin should land inside the angle of the landing area.
6. The thrower should remain within the limits of the throwing area until the javelin has landed.
7. The thrower should start making his attempt within one minute after the number of the thrower has been announced.
8. Before releasing the javelin, the athlete should not make a complete turn of the body at any point of the throwing process so that the thrower's back faces the throwing area.

Summary

The technique for triple jump, which is a horizontal jump in athletics, consists of five phases. They are the approach run, hop, step, jump and landing.

The technique for javelin throw, which is one of the throwing events, can be studied under seven phases. They are preparation, approach run, pulling the javelin backwards, crossover, power position, delivery and recovery.

It is essential that athletes engage in training exercises for all of the above events.

Exercise

1. Name the three jumps that constitute triple jump.
2. Write two rules that relate to triple jump.
3. Write the seven phases of the technique that is adopted in javelin throw.
4. Write five rules applied in javelin throw.

13 Let us understand the musculoskeletal system

We are constantly in motion during the whole span of life. Three systems in our body that help us to do this are the skeletal system, muscular system and nervous system. In motion, the skeletal system acts as a lever. The muscular system provides the power and the nervous system provides the stimulus and coordination. As an adolescent you will find the knowledge of these systems useful.

In grade 10 you learnt about the structure and functions of digestive, respiratory, circulatory, excretory and reproductive systems. you also learnt about some diseases that affect these systems and how to prevent them.

In this chapter we will learn about the different systems that help with movements.

Muscular system

Muscles are important for movement of the body as well as for movement of the internal organs.

Anatomy of the muscular system

- Different types of muscles perform specific actions in various parts of the body.
- Different postures can be adapted due to the contraction and relaxation of muscles
- Tendons are attached to bones. They are thick and strong and help with movement.
- The muscles are attached to the bones and help with movements
- The energy needed is stored in the muscles
- The nerves send stimuli for contraction and relaxation of muscles and help with movements
- Special muscles in the face are involved when crying, laughing, showing happiness and sadness

There are three types of muscles classified according to the function and structure

1. Skeletal muscles
2. Smooth muscles
3. Cardiac muscles

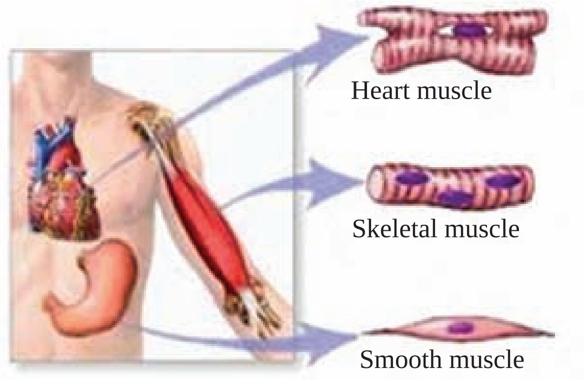


Figure 13.1

Skeletal muscles

These muscles constitute 40% of the body weight. They are long and cylindrical in shape. The two ends are attached to the bone by tendons. They are called striated muscles due to the horizontal striations seen in the muscle. The muscles are controlled by the brain. They contract in a rhythmical manner and get tired. There are more than one nucleus and a large number of mitochondria in a muscle cell. Glycogen is stored as a source of energy in the muscles.

Striated muscles are present in the arms, legs and diaphragm

Smooth muscles

These muscles constitute about 3% of body weight. There is one nucleus in the muscle cell. The muscles are long and the striations are not seen. They contract in a slow, rhythmical manner and do not get fatigued.

Smooth muscles are present in walls of arteries, veins and the digestive tract

Cardiac muscles

The cells branch out. Each cell has one nucleus. A large number of mitochondria are present in the muscle cells. These muscles contract nonstop in a rhythmic manner right throughout one's life.

Cardiac muscles are present only in the heart.

Functions of the muscular system

1. Aids in body movement by contraction and relaxation
2. The heat generated during muscle contraction is used to maintain the body temperature
3. Storage of glycogen needed to generate energy
4. Intercostal muscles and diaphragmatic muscles aid in respiration.

How does muscular system work

Contraction and relaxation of muscles

The skeletal muscles help in movements and to maintain posture. The muscles have a narrow end and a broad middle. They are designed to help with movements that will be efficient.

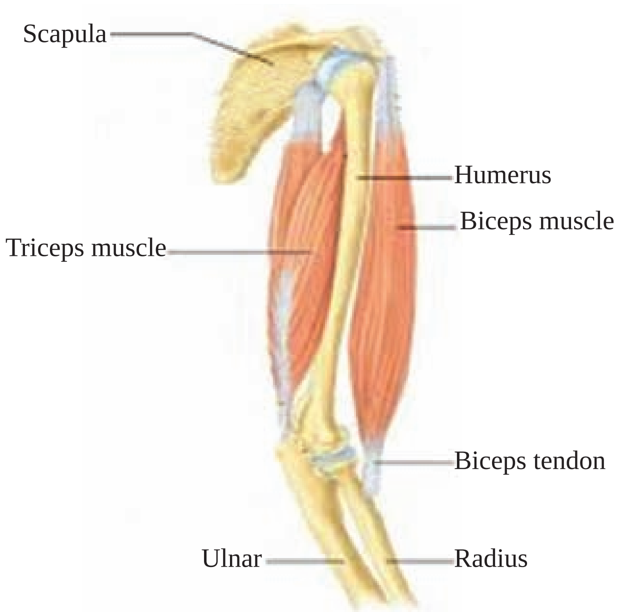


Figure 13.2 - How skeletal muscle is attached to the bones of the arm

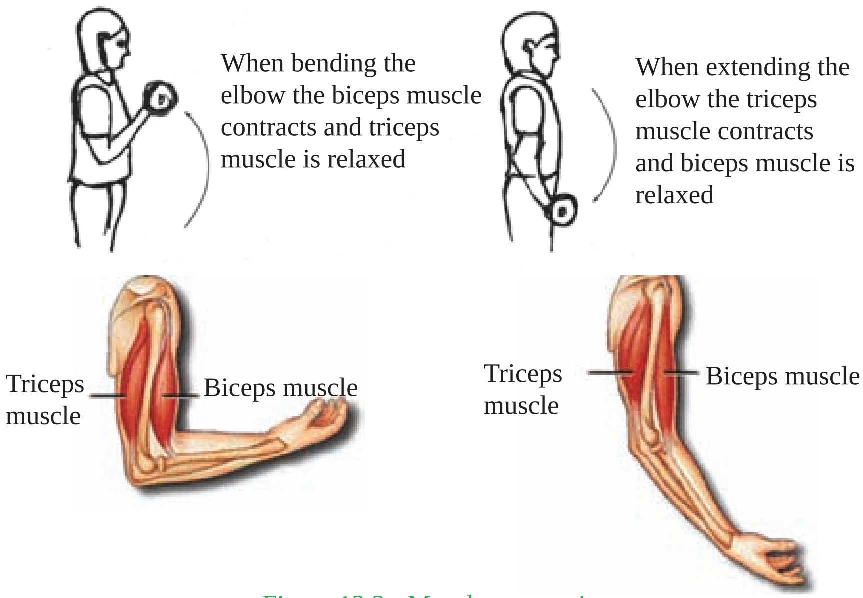


Figure 13.3 - Muscle contraction

In figure 13.2 you can see how a skeletal muscle is attached to a bone. In figure 13.3 see how the muscles contract when the arm is being used.

When the elbow is bent the biceps muscle contracts and triceps is relaxed. When elbow is extended the triceps contracts and the biceps is relaxed.

Activity

Hold a book in your right arm and bend your elbow. Notice how the muscles contract and relax.

To understand how muscles work let us learn how each muscle fibre functions.

The basic structural unit of an organism is a cell. The basic unit of a muscle is known as a muscle fibre. Figure 13.4 shows how multiple muscle fibres make a muscle bundle and many muscle bundles make a muscle.

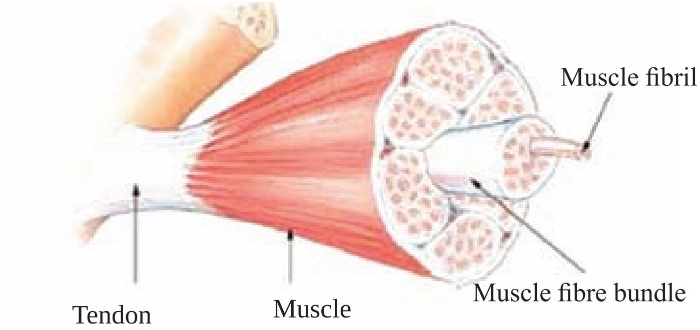


Figure 13.4 - cross section of a skeletal muscle

Activity

Create a cross section of a muscle using drinking straws

Ratio of fibres

You have learnt about the structure and function of muscle fibres. Recall how your friends play in the grounds. One friend can run very fast but gets tired soon and another can run slowly for a long period without getting tired. Various types of muscle fibres help in these situations.

For extra knowledge

The energy needed to perform a task generated by a muscle is known as muscle energy.

The muscles of the student who runs fast will contract and relax very quickly. Whilst the muscles of the student who runs slowly for a long period will contract and relax slowly.

Sports medicine has helped the progress of sports immensely. Two types of fibres have been identified. They are slow twitch fibres and fast twitch fibres. The fast twitch fibres are further categorized into two. In this grade you are expected to study the slow twitch and fast twitch fibres only.

You are born with a particular ratio of these twitch fibres. The friend who runs very fast

has a higher ratio of fast twitch fibres to slow twitch fibres whilst the friend who runs slowly has a higher ratio of slow twitch fibres to fast twitch fibres.

1. Slow twitch fibres- STF; Type 1

These fibres are also known as red fibres as oxygen is utilized to generate energy (red blood corpuscles transport oxygen). These fibres have a lot of capillaries. The sportsmen with a high ratio of these fibres have the ability to run long distances successfully.

2. Fast twitch fibres FTF; Type 11

Oxygenation (need to use oxygen) in these fibres is low. These fibres do not utilize oxygen to generate energy. Therefore the ability to contract is more in these fibres.

Sports persons with a higher ratio of these fibres can perform events that require speed such as sprints, jumps, throws and excel at them.

Identify the differences between these two fibres

Table 13.1- Differences in fast and slow twitch fibres

Characteristics	Fast twitch fibres	Slow twitch fibres
Colour	white	red
Storage food (glycogen)	more	less
Speed of contraction	more	less
Aerobic respiration	less	more
Anaerobic respiration	more	less
Resistant to fatigue	less	more
Involved in high impact sports	more	less
Involved in long duration	less	more

Uses of skills training in sports

By suitable training we can make a few changes to the fibres we are born with.

- The area of the cross section of the fibre can be increased. Strength can be developed by doing resistance exercises.
- The number of units in motion are more. Impulses travel to the fibres fast and the velocity is increased. Therefore the fibres contract very fast.
- The number of mitochondria present in fibres increases. The production of ATP and storage increases. Thus one does not get tired quickly.

- The density of blood vessels in the muscles increases. The number of capillaries in the muscles increases. This enables the rapid transport of glucose and oxygen to the muscle cell. Excretory products are also transported out rapidly. Thus performance can continue for a longer period.

The above can be transformed depending on the type of event and training of the sportsman. Therefore suitable measures can be taken to improve the stamina of short and long distant athletes.

The factors that hinder the functioning of the muscular system

1. Nutritional deficiencies
   The development of muscles is affected due to nutritional deficiencies from the time you are a foetus right until you pass the other developmental stages

2. Wrong postures
   Wrong postures tire the muscles and cause muscular ailments. When muscles are not used properly a lot of energy is used. Therefore wrong postures over a long duration can lead to various diseases.

3. Inadequate amount of exercise and rest
   The muscles are affected when the body does not get adequate exercise. Rest is needed for cells to regenerate. A person can have physical ailments if he works for a long period without rest. It is important that you do warm up exercise when you engage in sports or exercises, as the muscles can get damaged.

Protecting the muscular system

1. Good eating habits
   Balanced meal including calories is important to protect the muscular system. It is important to eat at regular times and to eat natural food as much as possible. It is necessary that you eat high quality proteins and non-vegetarian food.

2. Maintain good postures
   Fatigue felt by muscles can be minimized by maintaining a correct posture. Maintaining good postures help to have healthy muscles.

3. Taking adequate exercise and rest
   An adult should engage in at least 30 minutes of exercise daily. Exercise develops the function of muscles , capillaries that are connected to them and

nerve endings. Getting at least six hours of sleep a day regenerates the tired body. The worn out cells are regenerated and muscles remain the original state by rest. It is important that one does warming up exercises before sports or exercises.

Skeletal system

Anatomy of the skeletal system

The shape of your body is maintained by the skeletal system that comprises 206 bones.

Special characteristics of the skeletal system

- The brain is protected by the thick and rounded skull.
- The eyes are protected by the sockets.
- Ball and socket joints help perform a wide range of movements
- The digits in the fingers help with the ability to hold
- The female's pelvic bones are designed to assist with child birth
- Ribs protect the heart and lungs
- The femur is long, broad and strong to bear weight.
- Cartilage at end of bones protects the bones within a joint.
- A bone heals even if it fractures
- Bone marrow manufactures blood corpuscles

The bones cannot function alone. Muscles help in movement.

Human bones are initially formed with cartilage and subsequently replaced by bone cells. The deposition of minerals makes it hard. Most bones are hollow. The marrow in the hollow portion of the bone manufactures blood cells. Bones store calcium and phosphate.

Classification of bones depending on the shape

1. Long bones- present in arms and legs
2. Short bones- present in the fingers and toes
3. Flat bones- skull, ribs, shoulder blades and pelvic bones
4. Irregular bones- spine, some bones in hands and feet

Functions of the skeletal system

- Gives shape to the body
- Bears the weight of the body
- Muscles are attached to bones by tendons for movement of joints
- Manufactures blood corpuscles
- Stores minerals such as calcium
- Protects the internal organs

How does skeletal system work

Joints that help in movements

Hinge joint

- This movement is similar to a door being opened and shut. The joint acts similar to the hinge of a door.
- Movement is not more than 180°
- Examples for this joint are the elbow, knee, and digits of fingers and toes.

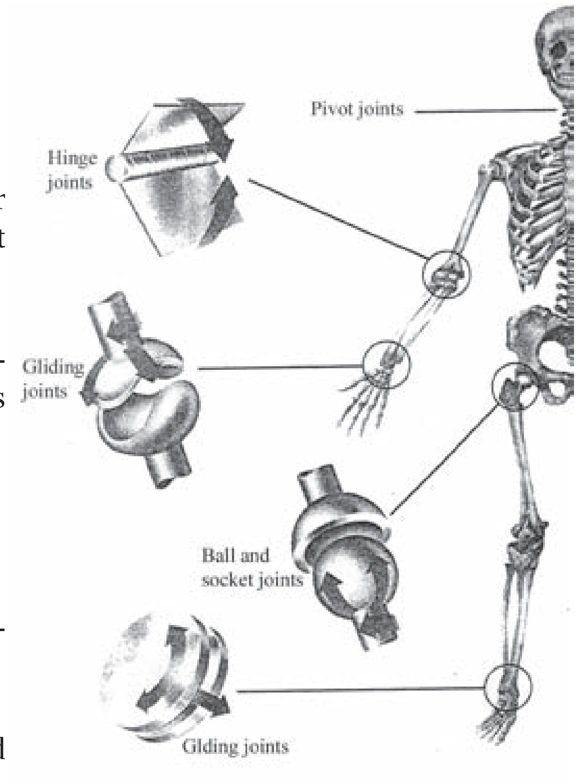


Figure 13.5

Ball and socket joint

- This is similar to a ball in a corresponding cavity
- Movement is 360°
- Examples are shoulder joint and hip joint

Pivot Joint

- The joint where the Atlas (1st vertebrae) and Axial vertebrae (2nd vertebrae) meet in the vertebral column
- This joint has been designed so that the head can be moved from side to side and up and down

Gliding Joint

- Ankle and wrist joints have gliding joints
- Movements can be performed to the front and back left and right

Bones and muscles act as levers during movements. A lever is a rod that can be moved around a stable point. This bone is similar to the rod.

- Fulcrum or pivot is the fixed point in a lever. Joints in our body are examples of this
- The effort is the power on the lever. It is done by muscles.
- The resistance on the lever is the load. A mass raised by the arm is an example.

The movements in our body due to muscle and bones are similar to one of three types of levers

Type 1 lever

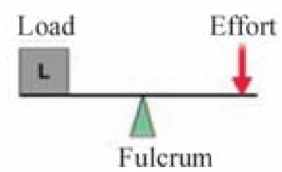


Figure 13.6

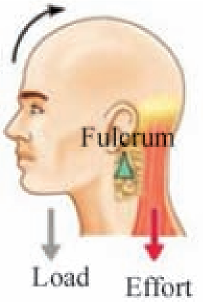


Figure 13.7

Figure 13.6 shows how the load and effort are on either side of the fulcrum

See Figure13.7 for example of above type of lever in the body.

Effort	- energy is supplied by contraction of muscle
Fulcrum	- Atlanto - Axial joint between 1st and 2nd vertebrate
Load	- weight of head

Type 11 levers

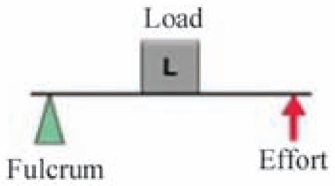


Figure 13.8



Figure 13.9

Figure13.8 shows the fulcrum and effort being on either side of the load. An example for this type of lever is a sports man standing on his toes. See figure 13.9

Fulcrum - the toes on the floor
Effort - the gastrocnemius and soleus muscles of leg contracting
Load - the weight of the body being directed down along the line of gravity

Lever type 111

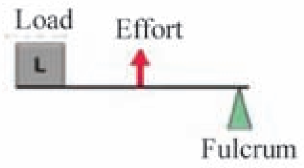


Figure 13.10

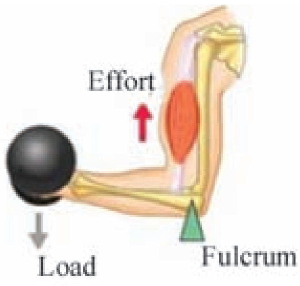


Figure 13.11

Figure13.10 shows the fulcrum and the load on either side of the effort.
An example for this type of lever in the body is a sportsman holding a put shot in the hand and bending the elbow to raise the put shot. Refer figure 13.11

Fulcrum - elbow
Load - put shot
Effort - biceps contracting to get the power

Factors that hinder the functioning of the skeletal system

1. Accidents
2. Congenital bone diseases
3. Poor posture
4. Nutritional deficiencies and obesity
5. Arthritis

Ways of protecting the skeletal system

1. Good nutrition
2. Healthy life style
3. Maintaining a good posture
4. Exercising daily
5. Obtaining adequate amount of calcium from food

Nervous system

Impulses needed for movements to occur are supplied by the nervous system. We can understand the function of this system by learning about it.

Structure of the nervous system

- Impulses obtained from the environment can be converted to electrical impulses
- Impulses are transmitted in a very short time
- Reactions can occur with or without thinking
- The brain controls our actions and is able to memorise them

The nervous system can be divided into two

1. Central nervous system
2. Peripheral nervous system

Central nervous system

brain :

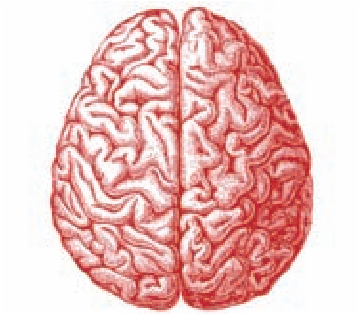


Figure 13.12 - Cerebrum

The brain and the spinal cord are the components of this system. The prominent part of the brain is the cerebrum. This constitutes left and right hemispheres that are divided by a sulcus. Cognitive functions such as memory, intelligence, responsibility, analysis, decent behaviour and learning are controlled by the cerebrum. Perceptions such as vision, hearing, taste, smell, touch, pressure , pain, warmth and cold are also identified by the cerebrum

Spinal cord :

The spinal cord is a cylindrical bundle of nerves that runs down from the brain through the vertebral column.

The spinal nerves arise from both sides of the spinal cord in pairs. There are 31 pairs of spinal nerves.

Peripheral nervous system

The 12 cranial nerves starting from the brain and the 31 spinal nerves arising from the spinal cord constitute the peripheral nervous system.

Nerve cells are known as neurons. There are three types of neurons

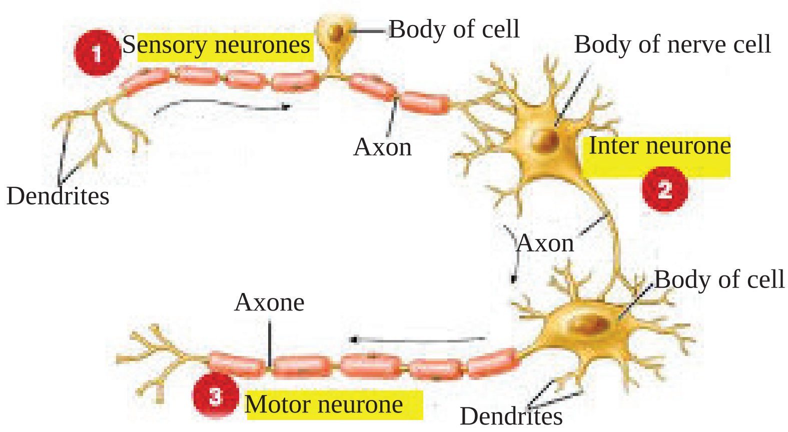


Figure 13.13

1. Sensory neurons
These nerves transmit impulses from sensory organs to the central nervous system

2. Motor neurons
These nerves transmit impulses from the central nervous system to the muscles

3. Inter neurons
Neurons that transmit impulses between sensory neurons and motor neurons

Functioning of the nervous system

Motor and sensory functions
The dendrites of sensory neurons start from sensory organs. The stimulus is taken up by the dendrites in the sensory organ. The axons of these neurons are situated in the central nervous system. The path of the impulses is directed from the organ towards the brain. The impulses in the motor neurons travel from the central nervous system to the effector which is the muscle.

The sensory organs such as the eyes, ears, nose, tongue and skin receive the stimulus and impulses are sent via the sensory neurons to the central nervous system as messages. The central nervous system send back a message with regards to the action that should take place via the motor neurons to the effector.

Reflexes

In sports we think of the action needed to perform. Sometimes we react to an impulse instantly without having to think. This is known as a reflex.

Recall how you reacted when your hand touched a hot electric iron. You may remember removing your hand immediately? That is a reflex action.

The stimulus is the heat. It feels to the skin slowly. Impulses travel from the skin through the sensory neurons in the spinal cord. The inter-neurons in the spinal cord sends impulses to the hand along the motor neurons. The hand is removed immediately. The message reach the brain little later and after the immediate response the person will realize the incidence that occurred. The harm is minimized as the action is done very fast.

The hand is taken off without our knowledge. It is known to us only after the reflex action. This pathway that impulses travel is called a reflex arc.

Skin → sensory neuron → inter-neurons in the spinal cord → motor neuron → biceps muscle

Sensory organ receptor — effector

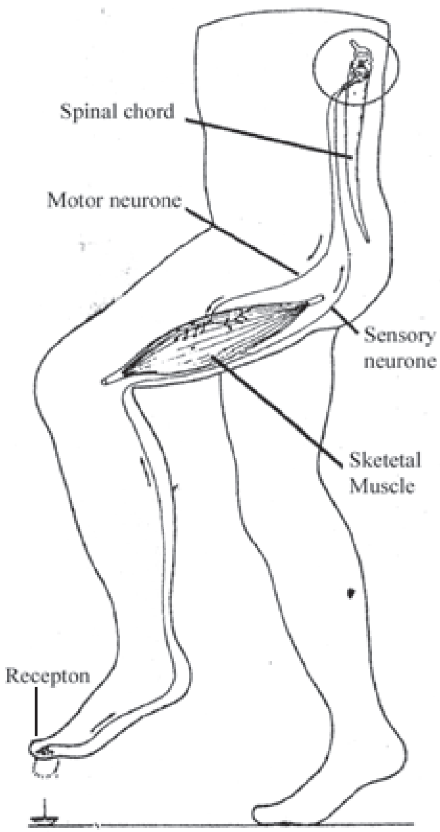


Figure 13.14

Conditioned reflexes

Scientists say that other than the innate reflexes we are born with, experience can develop reflexes. Reflexes that are developed from experience are known as conditioned reflexes. The pathway to these new reflexes is via the brain. Complex conditioned reflexes compared to the simple conditioned reflexes may not last

throughout life. Conditioned reflexes could be developed by systematic training. Thereby complex sports skills can be performed in the correct manner without difficulty.

Factors that cause harm to the nervous system

1. Smoking
2. Using illicit drugs and alcohol
3. Congenital diseases
4. Illnesses that occur during pregnancy and birth
5. Nutritional deficiencies that occur during pregnancy

Protecting the nervous system

1. Refrain from smoking
2. Abstaining from using illicit substances
3. Providing pregnant mothers and adolescent females proper nutrition
4. Exercising
5. Leading a stress free life and being happy
6. Getting adequate sleep and rest
7. Protecting the eyes, ears, nose, tongue and skin

How energy is supplied during movements

We learnt, there is a function of contraction and relaxation of muscles. For this action energy is needed. The energy is generated from ATP (Adenosine triphosphate) in mitochondria that is present in the muscle.

ATP molecule

Adenosine – Phosphate – Phosphate – phosphate

One adenosine molecule is attached to three phosphate molecules. Energy is generated when a bond between two phosphate molecules is broken. This energy is used for the contraction of muscles.

When ATP gets broken repeatedly ATP gets depleted. After energy is generated adenosine and 2 phosphate groups remains together to form Adenosine diphosphate.

ATP $\longrightarrow$ ADP + P + Energy → For muscle contraction

ADP cannot generate energy again till it is converted to ATP. For that the released phosphate should get attached. Energy needed for the production of ATP occurs in two ways.

1. Anaerobic method
2. Aerobic method

1. Anaerobic method

The glycogen stored in the muscles are used for this purpose. In speed events energy is produced without utilizing oxygen. Under this method while producing energy it produces lactic acid. This energy is utilized to convert ADP to ATP.

Glycogen $\longrightarrow$ Lactic Acid + Energy

This method can generate only a small amount of energy and also it can be supplied for a short period only. Lactic acid gets accumulated in the muscles and they get fatigued. In the presence of oxygen, the lactic acid is cleared and relieved the muscle from fatigue.

In events like 400 running this method is used to produce energy. In the final stages of 800m and 1500m events this method is used. Untrained athletes run the last few stages of a 400m event at a slow speed due to the accumulation of lactic acid.

2. Aerobic method

Glucose and fatty acids are used to generate energy in this method. Glucose or fatty acid in the presence of oxygen produce energy. The energy generated is used to convert ADP to ATP. Carbon dioxide and water are the by-products of this process.

Glucose + CO_2 $\longrightarrow$ CO_2 + H_2O + energy

Fatty acid + O_2 $\longrightarrow$ CO_2 + H_2O + energy

As oxygen is used in this method, it is known as aerobic method.

This method produces large amounts of energy. Energy generated by this method in not available very fast. Energy produced in this method is used in sports that take long duration of time such as Marathon, 10000m run etc.

Other than above methods there is an another method known as creatine phosphate method.

Creatine phosphate (CP) also known as **Phosphocreatine (PCr)**, is a molecule that serves as a rapidly mobilizable reserve of high-energy phosphates in skeletal muscles. When energy has to be supplied immediately, breakdown of creatine phosphate will provide the required.

Creatine phosphate ⟶ creatine + Phosphate + Energy

This energy will be used to convert ADP to ATP. This method can function with or without the use of oxygen. As it does not use oxygen, sometimes it is referred to as the Anaerobic Alactic method.

Events such as 100m, 200m, 100m x 4 relay, jumps, throws and carrying weight, which require a burst of energy instantly, specially at the beginning (first 2-3 seconds) is supplied by this method.

Involvement of the different systems during exercise

Involvement of the muscular system during exercise

- There are many ways that energy is generated for the muscles to act. During high impact exercise and low impact exercise energy is produced in different ways.
- In movements, muscles that are used more and use more force are stronger and bigger. It is due to the cross section being larger,
- By exercising, the endurance and flexibility can be improved.
- The number of mitochondria are increased and ATP increases.
- During training the lactic acid breakdown becomes fast.
- By exercising the activity becomes more efficient depending on the type of muscle fibres you posses

- Larger and stronger muscles are situated in places where there is a lot of strain on the body.
- To prevent muscle injury during strenuous activities muscles get fatigued.
- By training the density of capillaries are increased.
- The time taken to produce lactic acid can be lengthened by training
- By training, cardiac muscles get strengthen

Involvement of the skeletal system during exercise

- The limb bones are strong and long to bear the weight of the body and get stronger when exercising
- Presence of ball and socket joints help to increase the range of movements
- The natural position of the atlas vertebra help in a range of movements of the head.
- Muscles are attached to joints which aid in movements and get stronger with exercise.
- The natural position of the vertebral columns helps in the ease and efficiency of movements.
- Presence of arches in the feet help in efficient walking and running.
- The joints in the feet help to absorb the impact of vibration.

Involvement of nervous system during exercise

- Conditioned reflexes are developed
- Unnecessary movements are reduced due to the impulses being directed appropriately
- The parasympathetic nervous system works more during rest
- During exercise the sympathetic nervous system works more
- The organs work more efficiently eg: heart and lungs
- Thirst makes us drink water to compensate for the volume of water that gets excreted as sweat during exercise.
- Fainting attacks occur as a measure to regain oxygen lost during exercise to the brain.

Summary

Three systems are involved for movement. The structure of these system have been designed to help with these actions efficiently.

The muscles help in movement by contraction and relaxation .

The skeletal system acts as a lever through the connection of joints.

The nervous system generates the required impulses for movements.

The energy needed for movement is obtained by the breakdown of ATP to ADP. The ADP broken down is converted to ATP from energy obtained by the aerobic and anaerobic systems.

When the systems do not function as desired, the efficiency of the movements are reduced. By preventing this we are able to maintain good postures for good productivity and efficiency.

Exercise help in strengthening the muscular, skeletal and nervous systems.

Exercise

1. Name three functions for each of the muscular and skeletal system
2. Name three ways of protecting the nervous system
3. Find out the ratio of muscle fibres in a 100m sprinter and a Marathon runner
4. Describe how your body functions as the three different levers function, giving examples
5. Describe how the muscular, skeletal and nervous system function during exercise

14 Let us maintain fitness related to motor skills

In order to lead a healthy life it is necessary to maintain physical, mental and social fitness. The complex life styles we lead today have made the modern man extremely busy. Activities that require a large amount of physical exertion in the past are now done easily with the use of modern technology. Furthermore, we are at risk of developing non-communicable diseases from a younger age due to the unhealthy lifestyle. Thus, it is necessary to maintain physical fitness through fitness programmes related to motor skills at your school as well as at home. Development of the main components of fitness related to motor skills will enable you to demonstrate better skills in sports and help you to engage well in day-to-day physical activities. As you already possess some of these skills, you will be able to develop them further through practice.

In Grade 10 you have learnt about health related fitness factors and programmes to develop these.

In this chapter you will be able to learn about components of fitness related to motor skills and exercises to develop them.

Components of fitness related to motor skills

There are 6 components in fitness related to motor skills.

1. Power
2. Agility
3. Coordination
4. Balance
5. Speed
6. Reaction speed

Power

The ability to exert or release a maximal force in the shortest time is known as power. It can also be defined as the ability to move by instant exertion of muscle force against resistance. Power is a product of muscle strength and speed.

Power is essential in all sports. However, some sports require more power than others.

Examples of instances where power is important in sports

- **Weight lifting**



Figure 14.1- Weight lifting

In events such as snatch and power clean, in order to succeed it is necessary to lift a heavy weight instantaneously. The competitor with greater power would win such an event. The resistance is produced by the weight lifting equipment, which is overcome by muscle strength which will result in movement of the equipment.

- **Athletics**

Events such as throwing the shot put and the take off of the long jump require competitors to have developed greater power. In throwing the shot put, it is necessary to concentrate the power in your body on to your throwing arm and to let go of the shot put very quickly. This requires training in specific technical skills of throwing the shot put.

Similarly, the power exerted on the take off board in long jump enables the athlete to jump a longer distance. Therefore the athlete who can instantly release the power in his legs during long jump is able to demonstrate greater skill.

Further examples of how power is useful in sports include;
- spiking in volleyball
- the power exerted at the start of a short distance running event

Activities to improve power

I. Throwing a medicine ball

Medicine balls are made to different weights. The medicine ball can be thrown both forward and backwards using both arms. The ball can be thrown using one arm as well. The steps noted below should be followed when throwing a medicine ball.
- Stand with both feet parallel to each other.
- Hold the medicine ball close to your chest using both hands.
- Bend the knees and move your body downwards, while holding the medicine ball.
- Raise your body while fully extending your arms and throw the medicine ball as far away as possible quickly.



Figure 14.2 - Trowing medicine ball

II. Jumping exercises (these exercises need to be done quickly)

- Hop 5 steps forward using your left leg.
- Hop 5 steps forward using your right leg.

- Keep both feet together and jump forward.
- Keep a few small boxes an equal distance apart and hop over them with one leg (This exercise should be carried out using both feet alternately).

Activity

Use items that can be found in your school and neighbourhood and plan activities that can be done to develop power and carry them out in your playground.

Agility

Agility is the ability to instantaneously and smoothly change course, controlling the direction and position of your body.

In certain sports activities it is necessary to quickly and instantaneously change your posture. When changing from one posture to another, agility is required to identify the next change in posture and to change into it quickly.

Examples of instances where agility is useful in sports



Figure 14.3 - Football

- In sports such as rugby, football and basketball it is necessary to take the ball to the goal while avoiding the players from the opposing team (in order to avoid one's opponents while moving forward, it is necessary to be able to instantaneously change posture).
- In sports such as football and hockey, the goalkeeper needs to change his/her posture depending on how the ball is coming towards him/her.

- Agility is very useful in sports such as javelin throw and hurdles.

Activities to improve agility

I. Zig zag run

Arrange cones into two parallel lines with space in between adjoining cones. This enables the participants to weave through them in a zig zag manner.

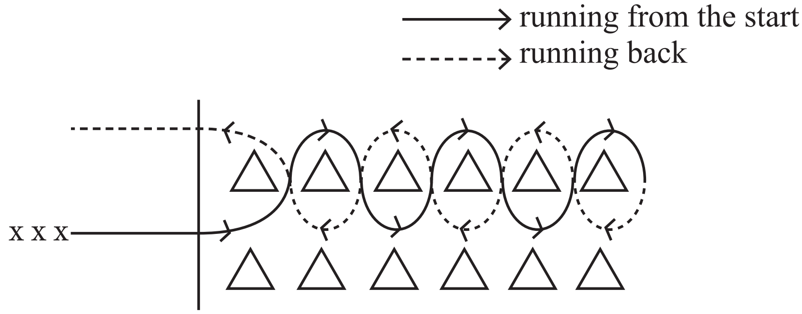


Figure 14.4

II. Shuttle run

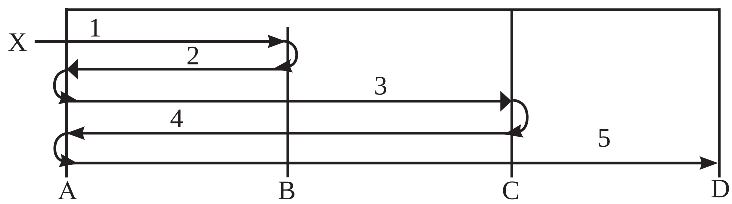


Figure 14.5

According to the figure 14.5 draw four lines named ABCD an equal distance (1m) apart from each other. When a signal is given run from line A to line B and touch line B. Instantly turn around and run back to line A and touch line A. Turn around instantly again and run to line C and touch line C. A person involved in this activity will need to change the posture instantaneously.

Activity

Design other activities that would improve agility and practise them in your playground.

Coordination

Coordination is the ability to use your senses such as hearing and vision and different parts of the body together, to perform tasks smoothly and accurately. For good coordination there should be optimal functioning of the nervous system and the musculoskeletal system of the body. Coordination is important for all sports.

Examples of instances where coordination is useful in sports



Figure 14.6 - Badminton

- In sports where rackets are used, such as table tennis, squash and badminton, there should be good coordination between the eyes and hands. It is important for the player to see the ball and to move the racket to where the ball is coming from.
- In parades to act on a given command the participants need to coordinate what they hear with their musculoskeletal system and move their hands and feet accordingly.
- Competitors with good coordination excel at sporting competitions.

Activities to improve coordination

I. Running ladder

Draw 10 squares, which are 50cm X 50cm in the playground according to figure14.7

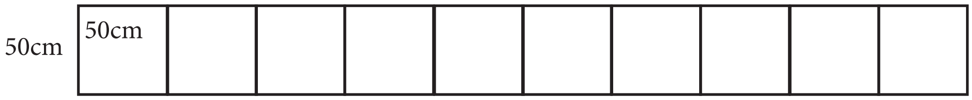


Figure 14.7

- Jump from one square to the next using both feet as you move forward.
- Next use your left leg to hop from one square to the next.
- Thirdly use your right leg to hop from one square to the next.

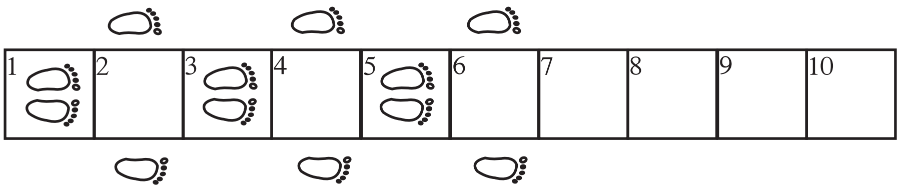


Figure 14.8

- Keep both feet inside the first square.
- Next keep both feet outside the second square.
- Keep both feet inside the third square again.
- In this manner jump forward. (Figure 14.8)

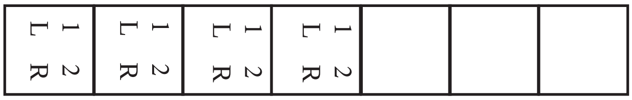


Figure 14.9

- First keep your left foot in the first square.
- Then keep your right foot in the same square.
- Move your left foot to the second square first and then keep your right foot there.
- Move forward placing your feet in this pattern. (Figure 14.9)

II. Other exercises

- Run on the spot slowly to the rhythm of 1, 2, 3, 4
- To the same rhythm, first bend your left leg and while raising it forward use your right hand to touch the toes of your left foot.
- Next bend your right leg while raising it forward and use your left hand to touch the toes of your right foot.
- Thirdly extend your left foot backwards and touch your toes using your right hand.
- Fourthly extend your right foot backwards and touch your toes using your left hand.

Do this exercise slowly according to the numbers initially, but once you are used to the sequence you can increase the speed.

Activity

Plan exercises that can be done to develop coordination with or without the use of items that can be found in your school and neighbourhood and do them in your playground with guidance of your teacher.

Balance

The ability to maintain and control your body either when still or when moving is known as balance.

Examples for maintaining balance when still or during slow movements respectively are standing at ease and serving in volleyball.

Gymnastics is an example of maintaining balance when there are quick movements.

Examples of instances where balance is useful in sports



Figure 14.10 - Gymnastic

- In gymnastics, all the movements and the finale need to demonstrate good balance in posture.
- In weight lifting good physical balance is demonstrated when the athlete lifts the weight above his head at the end.
- In martial arts a person must be well balanced while delivering a punch to the opponent as well as when landing after an attack.
- Ballet dancing also requires good balance.
- In athletics, especially high jump and throwing the shot put balance is important.

Activities to improve balance

I. Jump up and turn half a circle and land on the ground while maintaining balance.

II. Jump up and turn full circle and land on the ground while maintaining balance.

III. Stand on one foot, bend your body forward, extend the other foot backwards and extend your arms to either side. Try to maintain this posture for a brief period (this exercise can be done alternating between the left and right foot).

Activity

Plan activities that can be done to improve balance and do them in your playground with the guidance of your teacher.

Speed

The ability to carry out the maximum motor activity during the shortest possible time is defined as speed. All athletes require speed to succeed in sports.

Examples of instances where speed is useful in sports



Figure 14.11 - Running events

- In running events such as100m, 200m, 100m X 4 relay
- The approach run of the long jump
- Running between the wickets in cricket

Activities to improve speed

II Run fast for approximately 30m.

III. Run downwards over a slight incline.

IV. Roll a ball on the ground and run behind it and try to catch or touch the ball.

Activity

Plan activities that can be done to develop speed and do them in your playground with guidance from your teacher.

Reaction Speed

The speed with which one is able to respond to an external stimulus is called the reaction speed

Sportsmen with a fast reaction speed can make use of this to win games. In team sports players need to react to the movements of the opponents as well as the sporting equipment instantaneously. Thus it is an important skill to develop in sportsmen.

Examples of instances where reaction speed is useful in sports



Figure 14.12 - Wicket keeping

- At the start of short distance running events.
- The wicket keeper needs to have a fast reaction speed in cricket.
- Goalkeepers in football and hockey also require a fast reaction speed.

Activities to improve reaction speed

I. 'Meeyo Meemo' game-Listen carefully and respond to the correct word.

II. Draw a starting line and lie on your back close to it. When the leader blows a whistle, or claps his hands, get up and start running forward.

III. Throw an empty tin backwards while standing and start running forward when you hear the tin hit the ground.

Activity

Plan activities that can improve the reaction speed and do them in the playground with the guidance of a teacher.

Summary

The components in fitness related to motor skills include power, agility, coordination, balance, speed and reaction speed.

The ability to exert or release a maximal force in the shortest time possible is known as power.

Agility is the ability to instantaneously and smoothly change course, controlling the direction and position of your body.

Coordination is the ability to use your senses such as hearing and vision and different parts of the body together, to perform tasks smoothly and accurately.

The ability to maintain and control your body when still or when moving is known as balance.

The ability to carry out the maximum motor activity during the shortest possible time is defined as speed.

The speed with which one is able to respond to an external stimulus is called the reaction speed.

Developing these fitness related components will enable you to do well in sports.

They also play an important role in successfully engaging in day-to-day activities and leading a healthy life.

To develop each fitness related component, you must engage in the relevant exercises.

Exercise

1. Name the six components of fitness related to motor skills
2. Give two examples each of how the above components are useful in sports
3. Describe one activity each for improving the six components of fitness related to motor skills

15 Let us maintain good interpersonal relationships

Good interpersonal relationships are positive relationships between two or more people. In our lives, we have to associate with others all the time. In early childhood our relationships are restricted to our family, but when we commence schooling these relationships extend to our school friends and teachers. In addition, participation in sports and other extra curricular activities leads to building relationships with others in our community. As adults, we build relationships with various people in society including those we meet in universities and other educational institutions, workplaces and in the society at large.

In grade 10 you have learnt about emotional balance and stress management, which are necessary for mental and social well being.

This lesson teaches you how to maintain good interpersonal relationships.

Activity

In our day-today life who do we develop interpersonal relationships with? They can be individuals or groups. Write them down in the table below.

Table 15.1

Family	School	Peers	Others
Parents	Teachers	Sports teams	Religious organisations
Siblings	....	....	Youth organisations
....	....	....	....
....	....	....	....
....	....	....	....
....	....	....	....

The importance of maintaining good interpersonal relationships



Figure 15.1

There are many advantages in maintaining good interpersonal relationships with others in the society. Much can be learnt by having relationships with people from varying age groups, religious and ethnic backgrounds, diverse areas of knowledge and socio-economic strata. We must have the ability to understand those who we associate with and be able to identify their skills, habits, talents, likes and dislikes.

Working in a group helps us to develop our skills in cooperation, problem identification, problem solving and decision-making.

Through association with elders we learn customs, habits, laws and regulations in the family, community and the country.

In addition skills in exploring, observing and reviewing will improve our ability to understand the world around us and people living in it.

Good interpersonal relationships develop our ability to understand the emotions of others and to respond to them appropriately. They improve our skills in effective communication and enable us to receive love and respect from others and to live harmoniously in society.

Outcomes of different types of interpersonal relationships



Figure 15.2

Table 15.2

	The positive outcomes	The negative outcomes
Media	• Access to information • Access to new knowledge • Opportunity to launch new creations • Improves communication skills • Improves critical thinking • Improves artistic appreciation	• Spread of false rumours • Distribution of disturbing images • Exposure to meaningless programmes • Interference with education • Promotion of alcohol and smoking • Influence people to engage in wrongful activities
Peers	• Learn how to lead and to be a follower • Learn to be flexible • Develop team spirit /camaraderie • Share love and kindness • Receive security and acceptance • Opportunity to learn about others ideas • Learn to identify social issues and take action	• Use of alcohol and illicit drugs • Engage in dangerous activities • Engage in misconduct • Making wrong decisions

Other groups	• Learn to emulate other groups • Become a self learner • Learn about customs and behaviour • Identify different social strata • Gather new information • Receive love and protection	• Use of alcohol and cigarettes • Engage in illegal activities • Exposure to bad influences • Learn harmful ideologies and adverse life styles

Important skills in maintaining interpersonal relationships

Many skills are necessary to maintain good interpersonal relationships. Let us try to recall what we have learnt in the previous years.

Activity

Try to imagine how you would feel in the following situations:

- A friend in your neighbourhood is placed first in an all island essay competition
- Your friend's father meets with an accident while abroad

1 Empathy

Empathy is the ability to understand and share the feelings of another person. An example of empathy is your ability to understand a friend's sadness and help him, if he had to leave a match midway due to an injury which occurred on the playing field.



Figure 15.3

Empathy also includes sharing happiness when one of your friends or a person known to you is victorious or sharing sadness when one of your friends is in trouble. Being sensitive towards the feelings of others is important in maintaining good interpersonal relationships.

2. Communication skills

Communication skills are required to exchange ideas, express emotions, hold discussions and solve problems.

3. Make correct decisions

We often have to make decisions, when associating with others. These decisions may include simple decisions such as “What game shall we play this afternoon?” as well as decisions that require deep thinking such as " which stream of subjects should I select for advanced level examination?". When making a decision, it is important to discuss with others and to respect their opinions.



Figure 15.4

4. Self-awareness

The ability to appreciate your own emotions, beliefs, likes and dislikes is known as self-awareness. It enables us to be aware of the way we should behave during interactions with others.

5. Critical thinking

In decision making you must learn to consider all the available information and critically analyse it.

6. Creative thinking

It is important to be creative in your thinking when dealing with others, as it would minimise conflicts. As a result of it, you will be a more likeable person to others.



Figure 15.5

Activity

Describe how you would face the following situations successfully.

- You have gone on a holiday with your friends. One of your friends has brought a bottle of alcohol and is insisting you drink from it.
- One of your friends, who is an active member in a political party is pressurising you to cut school and help him with his political activities.
- You have to explain to your parents, who expect you to study in a particular stream for the advance level examination, that you do not wish to do so.

Summary

We have to maintain good interpersonal relationships with many individuals and groups in our day-to-day life.

Good interpersonal relationships are important to understand others and live in harmony, to share experiences and knowledge, maintain unity, love and security.

There can be both positive and negative outcomes in interpersonal relationships.

Groups that we maintain interpersonal relationships with can shape our behaviour and influence our lives in a positive or a negative manner.

In order to maintain good interpersonal relationships, we should develop several skills such as empathy, communication skills, sound decision making, self-awareness, critical and creative thinking.

Exercise

1. Name five groups that you would have interpersonal relationships with
2. List five benefits of having good interpersonal relationships
3. Name six skills that you need to develop in order to have good interpersonal relationships

16 Let us identify challenges in adolescence

The World Health Organization defines adolescence as the "period between 10 and 19 years of age". This is the period of transition from childhood to youth. This transition brings about many changes in adolescents and pose many challenges to them. Knowing how to overcome the physical, social and psychological changes will help you to successfully face the challenges associated with them.

In grade 10, you learned about various challenges you face such as sport injuries, accidents in daily life, disasters and sexual abuse.

In this lesson you will update the knowledge you gained in previous grades on adolescence and learn about the challenges faced during adolescence.

Why is adolescence an important period in your life?

- It is the period of transition from childhood to adulthood
- It is a period when future citizens are formed
- Adolescents are a resource for the country
- It is a period of rapid physical, mental and social changes occur
- It is a period you are ready to take on responsibilities
- It is a time you are ready to explore and experiment



Figure 16.1

Physical changes during adolescence

Table 16.1

Changes in males	Changes in females
• Increase in height and weight • Broadening of shoulders • Increase in muscle mass	• Increase in height and weight • Development of breasts and skin becomes smooth • Broadening of hips
• Reduction of deposition of subcutaneous fat	• Increase deposition of fat in subcutaneous tissues
• Growth of hair in the axillary, chest, pubic and limbs	• Appearance of axillary and pubic hair
• Increase in the size of genitals	• Increase in size of genitalia
• Development of acne on the face	Development of acne on the face
• Increase perspiration and body odour	• Increase perspiration and body odour
• Production of sperm	• Start of menstruation
• Adam's apple (larynx) becomes prominent	• Production of vaginal secretions
• Voice becomes deep	
• Growth of beard	

In addition to physical changes mentioned in the chart above, mental and social changes too occur during this period.

Mental and social changes during adolescence

1. Interest in one's body
2. Interested in working for the common good
3. Tend to stand up against injustice
4. Desire to experiment
5. Greater creativity
6. Prefers to make independent decisions
7. Desire to display capabilities and be outstanding
8. Interest in the opposite sex



Figure 16.2

9. Interest in forming romantic relationships
10. Development of sexual feelings
11. Prefer company of adults
12. Interested in aesthetic activities

Do you know the reason for these physical and mental changes ?

Many of the physical and mental changes in adolescence occur due to the changes in hormones.

Due to production of FSH and LH hormones by the pituitary gland, oestrogen is secreted by the ovaries in females and testosterone is secreted by the testes in males. The action of these hormones cause secondary sexual characteristics in males and females.

An accelerated growth or a growth spurt is seen because of the action of the hormones. Many changes in the reproductive system such as production of sperm and activation of ovaries occur due to these hormones.

This growth spurt occurs between the ages of 9 and 12 years in girls and between 12 and 14 years in boys.



Growth spurt of girls



Growth spurt of boys

Figure 16.3

Your environment too contributes to your mental and social changes.
eg:

Influence of opposite sex
Influence of peers
Influence of advertisements
Behaviour and attitudes of family, relations and friends you associate with

Decisions made during this period tend to be influenced by feelings and with little concern about the outcome. The reason for this is the underdevelopment of the fore-brain. Therefore remember to take advice from elders (parent, teachers) when making decisions.

Problems and challenges during adolescence

1. **Problems related to nutrition**
   Improperly balanced meals, inadequate food, fast food, food made with large amount of wheat flour, oil or sugar may lead to obesity and other illnesses. Malnutrition at this age will have an effect on your next generation as well

2. **Problems associated with the development of secondary sexual characteristics**
   Among males, delayed growth of beard, size of the penis, changes in the voice among girls preoccupation with the size of the breasts, irregularities in the menstrual cycle, pain and discomfort during periods are some problems faced by adolescents.

   Figure 16.4

   Menarche and production of semen depend on various factors such as genetic composition, environment, growth and level of nutrition.

3. **Problems due to sexuality**
   - Myths regarding sexuality
     eg: Menstruation being considered a period of uncleanliness
   - Sexual abuse
   - Pregnancy

   Pregnancy could occur due to rape or even having sexual intercourse out of ignorance. Getting pregnant leads to many problems as they are mentally and physically not prepared for such.

4. **Problems due to peer groups**
Peer suggestions and attitudes are important at this stage. Unwillingness to go along with them may cause rejection and isolation from the group. As a result experimenting with illicit drugs, alcohol, smoking and engaging in unsuitable sexual activities at this stage can lead many problems.



Figure 16.5

5. **Problems encountered with the media**
Misleading advertising and false propaganda may create problems, if you try to experiment with them.

6. **Problems due to education and exam pressure**
    - Difficulties in understanding and remembering school work
    - Being scared of the reactions of parents and society due to failure in exams
    - Difficulties securing a job due to poor qualifications

7. **Problems arising from the use of illicit substances such as alcohol, illicit drugs, tobacco and banned stimulants**

- Due to use of illicit drugs, one can be rejected by society, education can be jeopardized, be expelled from school or work place, get involved in theft which can lead to being jailed or sent to probation via the judicial system.
- Using banned stimulants can lead to long term harm to the body or even cause death. In addition one will be banned from taking part in competitive sports, victory declared null and void and lead to shame.

8. **Problems due to growth and appearance**
Both males and females during this period are concerned about the body, complexion, height, being fat or thin, hair, acne and fungal infections. Boys may want to increase their physical strength, while girls may want to improve their appearance.

Unwanted pregnancies

Many of the physical, mental and social changes that occur during adolescence prepare girls to bear children in a responsible way in the future. Adolescence is the period where you prepare yourself and continuously grow until about 20 years for this task. Therefore you are not yet ready for it at this point in time. Mental and social preparation is needed to become a parent even if a girl is physically ready

to bear a child. This preparation varies depending on your religion, culture and the country you live in. Getting pregnant is a very responsible task. You should not take that responsibility until you have completed your education, attained economic stability and you are ready to bring up a child according to socially accepted norms.

Some girls have unwanted pregnancies due to their poor sexual education and by acting out their feelings instead of rational thinking. Boys who become fathers due to sexual liaisons at an inappropriate age face psychological and social problems.

Rape is a cause of unwanted pregnancy. Perpetrators of rape can be mentally ill or behave very irresponsible. However irresponsible behaviour of victims too can play a role in some instances.

The following factors can also be reasons for pregnancy in adolescence.

Table 10.1

Physical changes	Psychological changes or social factors
Sex hormones leading to; • Sexual stimulation • Physical development	• Attraction towards the opposite sex • Romantic relationships • Desire to be outstanding • Desire adult company • Desire to experiment • Interest in one's body • Ignorance about outcomes of sexual intercourse and pregnancy • Not being concerned about one's safety

Problems that arise from unwanted pregnancies

Becoming a parent before you attain physical, mental, social and financial stability can bring about undesired difficulties for you and the offspring.

Some problems can be isolation from society, early termination of education, menial jobs, fear, uncertainty about your and your child's future, early and forced marriages leading to despair, unhappiness and possible divorce.

A baby born under such circumstances might be malnourished and may even die at an early age. The society may consider such children as illegitimate and marginalise them. It has been seen that some people perform abortions to avoid unwanted child birth.

However, abortion is illegal in Sri Lanka. Abortions performed illegally and secretly in non-sterile environments can be hazardous to health and even lead to death of the mother. Such illegal abortions are considered on offence and penalized.

Under no circumstance can teenage pregnancies be approved. However knowingly or unknowingly if one gets pregnant, help should be sought from parents, close relatives as well as social service agencies without delay.

Good qualities of an adolescent

- Creativity and exploration
- Bravery
- Aesthetic sense
- Generosity
- Dedication to and enjoyment of social service
- Setting an example to peers and young
- Democracy
- Fairness

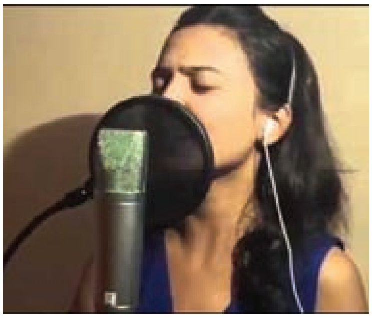


Figure 16.6

By using these qualities in a positive manner, you will be able to overcome challenges easily.



Figure 16.7

How to overcome challenges encountered during adolescence

1. Develop skills in thinking:
   - make responsible decisions,
   - think in a creative manner,
   - develop analytical thinking,
   - develop logical thinking.



Figure 16.8

2. Get involved in aesthetic activities such as dancing, arts, journalism or singing
3. Seek an adult's opinion before venturing out to explore, experiment, test and get involved in social responsibility projects such as shramadana
4. Get involve in religious activities
5. Do sports, learn methods of self-protection and improve phys ical fitness
6. Have a good understanding of reproductive health and functions of the human body by reading relevant educational books.

Summary

Adolescence is a period in life where many physical, psychological and social changes take place.

Hormones of your body and your physical environment have an influence on these changes.

To overcome challenges during adolescence, it is important to use your intelligence in a positive manner and develop good social skills.

Exercise

1. Why is adolescence considered an important period in your life?
2. Write three physical changes that occur in males and females during adolescence.
3. Write five challenges encountered during adolescence
4. Mention three problems that arise from unwanted pregnancies
5. Name five things you can do to overcome challenges encountered during adolescence--

17 Let us prevent sexually transmitted diseases

A sexually transmitted disease (STD), is a disease that is contracted from a sexual encounter with a person who is already infected with the disease. They can be contracted from an unprotected sexual encounter, sharing needles and unscreened blood transfusion. Sexually transmitted diseases are also spreading rapidly across the world. Unfortunately, adolescents contract these diseases due to lack of proper knowledge about them. Therefore it is important to know about STDs to prevent from contracting and spreading STDs

In the previous grades you learnt about communicable and non-communicable diseases and methods of preventing them by leading a healthy lifestyle.

In this lesson, you will learn about sexually transmitted diseases and preventive measures.

Sexually transmitted diseases

Gonorrhoea

Signs of disease

- A white discharge or secretion from a man's penis or a burning sensation or pain during urination.
- In females, occasionally a discharge or secretion from the vagina is seen, but this is rare.
- Females do not show signs of infection in the early stages.
- A baby can get infected from an infected mother during birth. The baby's eyes can be affected leading to loss of sight.



Figure 17.1

Genital Herpes

This can be transmitted during vaginal intercourse with an infected person as well as from kissing, or having oral or anal intercourse with such a person.

Once the virus enters the body, it will be in your system for life and symptoms will manifest on and off.

Signs of disease

- It starts with liquid filled bubbles and lead to painful wounds
- It takes between 10-14 days for the initial wounds to heal
- Pain or burning sensation when urinating
- Fever
- If a healthy person comes into contact with herpes bubbles that contain the virus, he may get infected.



Figure 17.2

The disease may occur even after an initial cure due to the following:

- Stress and fatigue
- Fever and other severe infections
- Menstruation
- Certain medicines
- Pregnancy
- Any from of immune deficiency

Although can be controlled, a cure has not been discovered for genital herpes as yet.

Syphilis

Symptoms appear between 9-90 days after being infected. Syphilis is contracted chiefly by infection during sexual intercourse, but can pass on to a baby during pregnancy.
This can be transmitted via unscreened blood transfusions too.

Symptoms and signs

- Painless lesion around or in the genitalia
- Inflammation of inguinal lymph nodes

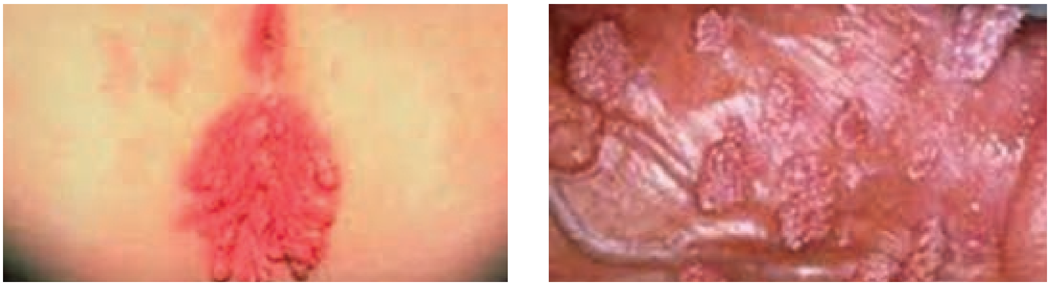


Figure 17.3

If proper treatment is not taken early, symptoms may manifest again after six months.

Chlamydia

Chlamydia can be transmitted through vaginal, anal or oral intercourse. There is a possibility of a child born to an infected mother becoming blind.

Symptoms and signs

- Discharge from vagina penise
- Pain or burning sensation during urination
- Cervix is affected, manifestation of symptoms is delayed in females
- Inflammation of area around the genitalia in males

Genital warts

Symptoms

- Warts that look like small pinkish scales are seen in groups of two or more or individually in areas around the vagina and penis
- In case of anal intercourse, the warts may appear around the anus, and in case of oral sex, they may appear around the mouth
- May be a cause for cervical cancer.

This condition can be managed, but it cannot be permanently cured.

HIV/AIDS

HIV/AIDS is caused by the human immunodeficiency virus.

Let us concentrate more on HIV/AIDS that has become a major problem.

HIV/AIDS

Methods of transmission

1. Due to unprotected sexual intercourse (among homosexual or heterosexual persons)
2. Via unscreened blood transfusions
3. From an infected mother to children:
   - during pregnancy
   - during delivery of baby
   - through breast milk

4. Using unsterilised needles (injection) by oneself or in a group
   eg: using drugs, creating body tattoos.

Illnesses are prevented by the body's own immune system by destroying germs. When infected with HIV, the immune system gets weak and the body becomes more susceptible to illnesses.

The symptoms of HIV manifest from 3-12 years after the virus enters the body. It may take even 10 years to manifest symptoms. Gradually, the body's immunity decreases. Due to this weakened immunity, other illnesses are contracted which can lead to death.

Any type of infection will make an AIDS patient very ill. Symptoms manifest depending on the type of infection.

Symptoms

- Loss of weight in a short period
- Diarrhoea lasting a long time
- Fever lasting for more than a month
- Tuberculosis
- Pneumonia

In addition,

- breathlessness, fatigue and cough lasting a long time
- inflammation of neck and axillary glands

- oral candidiasis
- night sweats
- loss of appetite

A large number of people are unaware that they are infected with HIV as it takes a long time for symptoms to manifest

The HIV virus cannot survive in a normal environment. It can survive in living cells only. The virus is predominantly present in the blood of an infected person.

Other secretions where on the virus can be found

- Semen
- Cervical and vaginal secretions
- Breast milk

Small quantities of the virus can be present in saliva, tears, sweat, urine and faeces, but illness cannot be transmitted from these secretions.

AIDS is not transmitted by:

- shaking hands
- mosquitoes
- kissing and embracing
- playing group sports
- sharing the utensils such as cups, plates,towels etc
- sharing the same household, bed etc
- sputum, nasal secretion and saliva
- toilets

When HIV enters the body, it grows rapidly and produces antibodies.

When AIDS was first identified, it was found that three times more men than women were infected. At present both males and females are equally infected.

Women are three to nine times more likely than men to get infected with AIDS because the wall of the vagina is thin and also after intercourse, sperm remain in the vagina for a relatively long period. Further, semen contains more virus than vaginal

secretions thus women are more likely to get AIDS than males.

Inadequate support from sexual partner to prevent the spreading of AIDS makes it a serious concern.

Women face many problems within the family and society when they get infected with HIV.

A newborn of an infected mother is likely to be infected. If both parents are affected they may die prematurely and their children become orphans. This is likely to become a major social issue.

Detecting HIV infection

1. Blood tests to detect HIV antibodies

There are two tests available:

 i. ELISA Test
 ii. Rapid Test

If either of these tests is positive for HIV, a further confirmatory test has to be performed as these are only screening tests. They cannot detect HIV during the first three months which is called the window period.

2. -Confirmatory test
   -Western Blot test

Importance of HIV testing

1. Once diagnosed as infected with HIV, ART (Anti Retroviral Therapy) can be given
2. By taking ART, quality of life and life span can be increased
3. When proper treatment is taken, the concentration of the virus is reduced and the chances of infecting another person is become minimal
4. By identifying infected people, the illness can be prevented from spreading
5. By taking ARV (antiretroviral drugs), maternal transmission of the virus during pregnancy and breastfeeding can be reduced.

If you have had unprotected sexual intercourse, it is important that you get tested for HIV. Testing for HIV is done at all veneraeology clinics in government hospitals island-wide free of charge and confidentiality is maintained.

Prevention of HIV and other sexually transmitted diseases

1. Postpone sexual activities until marriage
2. Limit sexual activities only to your spouse
3. Refrain from unsafe sexual activities
4. Identify risky situations in society and protect yourself from them
5. Maintain a strong family unit
6. If you suspect you have a sexually transmitted disease discuss with a doctor immediately
7. If you have a sexually transmitted disease take medication
8. Avoid sexual activity during an infected period
9. Avoid using illicit substances

People who have a higher likelihood of being infected with HIV and other sexually transmitted diseases

- Commercial sex workers
- Those with multiple sexual partners
- People who engage in homosexual activities
- People who have warts or wounds on their genitalia
- People who share needles to inject illicit substances
- Offspring of HIV positive mothers

Activity

Write an essay on the effect of sexually transmitted diseases on biology, economy and culture.

People who are HIV positive can have many psychological problems and emotions such as shame, anger, suspicion, stress and fear.

Summary

Sexually transmitted diseases are transmitted during sexual activity between an infected person and a healthy person.

Common sexually transmitted diseases are syphilis, herpes, gonorrhoea, chlamydia, genital warts and HIV/AIDS.

AIDS is a dangerous illness that weakens the immune system and makes people more vulnerable to other illnesses.

Sexually transmitted diseases also give rise to physical, psychological and social problems.

The best way to prevent contracting sexually transmitted diseases is to engage in safe and healthy sexual practices.

Exercise

1. Name four common sexually transmitted diseases
2. Name four ways AIDS can be transmitted
3. Name the tests that identify and confirm HIV
4. Name four reasons why HIV testing is important
5. Name four ways of preventing sexually transmitted diseases.

Glossary

abortion	ගබ්සාව	கருச்சிதைவு
acceleration	ත්වරණය	ஆர்முடுகல்
acquired immune deficiency syndrom (AIDS)	නතු කර ගත් ප්‍රතිශක්ති ඌනතා සහ ලක්ෂණය	நோய் எதிர்ப்புச் சக்திக் குறைபாடுகளின் அறிகுறி
adolescence	නව යොවුන් විය	கட்டிளமைப் பருவம்
aerobic	ස්වායු	காற்றுச் சுவாசம்
agility	උලැඟිතාව	துரிதம்
anaerobic	නිර්වායු	சுயாதீன எறிகை
angle of release	මුදාහැරීමේ කෝණය	விடுகைக் கோணம்
angle of take-off	නික්මීමේ කෝණය	மிதித்தெழும் கோணம்
anti oxidant	ප්‍රති ඔක්සිකාරය	ஒட்சி எதிரி
antibody	ප්‍රතිදේහය	நோய் எதிர்ப்புச் சக்தி
antiretroviral drugs (ARV)	ප්‍රතිවෛරස් ඖෂධ	வைரசு எதிர்ப்பு மருந்து
approach run	අවතීර්ණ ධාවනය	ஓடி அணுகுதல்
athlete bib	තරග අංකය	போட்டி இலக்கங்கள்
attack	ආක්‍රමණය	தாக்குதல்
balance	සමබරතාව	சமநிலை
ball in play	පන්දුව ක්‍රීඩාවේ යෙදෙන අවස්ථා	பந்து விளையாட்டில் ஈடுபடுத்தப்படும் சந்தர்ப்பங்கள்
ball out of play	පන්දුව ක්‍රීඩාවේ නොයෙදෙන අවස්ථා	பந்து விளையாட்டில் ஈடுபடுத்தப்படாத சந்தர்ப்பங்கள்
bio diversity	ජෛව විවිධත්වය	உயிரியல் பல்வகைமை
biological factor	ජීව විද්‍යාත්මක සාධකය	உயிரியற் காரணி
biomechanic principle	ජීව යාන්ත්‍ර මූලධර්මය	உடற்றொழிலியல் கோட்பாடுகள்
centre of gravity	ගුරුත්ව කේන්ද්‍රය	புவியீர்ப்பு மையம்
clearing the hurdle	කඩුල්ල තරණය	தடையைத் தாண்டுதல்
conditioned reflex	තත්වාරෝපිත ප්‍රතීකය	மண்டையோட்டுத் தெரிவினை
controlling the ball	පන්දු පාලනය	பந்தைக் கட்டுப்படுத்தல்
coordination	සමායෝජනය	ஒத்திசை
corner kick	කොන් පහර	மூலை உதை
corner post	කොන් කණුව	மூலைக் கம்பம்
critical thinking	විචාරශීලී චින්තනය	சிறந்த சிந்தனை ஆற்றல்
cross-over	හරස් පා තැබීම	பாதங்களைக் குறுக்காக வைத்தல்
crouch start	කුදු ඇරඹුම	குறும்புறப்பாடு
direct free kick	ඍජු නිදහස් පහර	நேர் சுயாதீன உதை

driblling the ball	පන්දුව පාදයෙන් රැගෙන යාම	பந்தை உதைத்தல்
dye	වර්ණකාරකය	நிறமூட்டி
early childhood	පෙර ළමා විය	முன் பிள்ளைப் பருவம்
effector	කාරකය	கணத்தாக்கம்
effort	ආයාසය	சுழலிடம்
empathy	සහකම්පනය	பரிவுணர்வு
fast twitch fibres (FTF)	වේගයෙන් ක්‍රියා කරන තන්තු	விரைவாக இயங்கும் தசை நார்
field defending	පිටිය රැකීම	மைதானம் காத்தல்
field event	පිටියේ තරගය	மைதான நிகழ்ச்சி
flavour	රසකාරකය	சுவையூட்டி
flight	ගුවන් ගත වීම	பறத்தல் நிலை
follower	අනුගාමිකයා	பின்பற்றுநர்
food allergy	ආහාර අසාත්මිකතාව	உணவு ஒவ்வாமை
food adulteration	ආහාර බාල කිරීම	உணவுக் நஞ்சாதல்
food safety	ආහාරවල සෞඛ්‍යාරක්ෂිතබව	உணவுக் காப்பு
foot print	පා සලකුණ	பாதத்தடயங்கள்
foot work	පාද හුරුව	பாத அசைவு
force	බලය	வலு
free kick	නිදහස් පහර	மிதித்தல்
free pass	නිදහස් යැවුම	சுயாதீன உதை
fulcrum	ධරය	எத்தனம்
goal	විදුම් කණුව	பேறு
goal kick	ගෝල් පහර	பேற்றுக்கு உதை
goal post	ගෝල් කණුව	பேற்றுக் கம்பம்
heading the ball	පන්දුවට හිසින් පහර දීම	பந்தைச் சொட்டிச் செல்லுதல்
health promotion	සෞඛ්‍ය ප්‍රවර්ධනය	சுகாதார மேம்பாடு
hight of release	මුදාහැරීමේ උස	விடுகை உயரம்
hight of take-off	නික්මීමේ උස	மிதித்தெழும் உயரம்
hop	කුන්දුව	கெந்துதல்
human resourse	මානව සම්පත්	மனித வளம்
indirect free kick	අනියම් නිදහස් පහර	நேரில் சுயாதீன
inertia	අවස්ථිතිය	சடத்துவம்
ingredients	අඩංගු ද්‍රව්‍ය	பதார்த்தம்
instant food	ක්ෂණික ආහාර	உடன் உணவு
jungle craft	වන ශිල්පය	வன நுட்பம்

jungle exploration	කැලෑ ගවේෂණය	வன ஆய்வு
junk food	නිසරු ආහාර	உடன் உணவுகள்
kick off`	පා ඇරඹුම	போட்டி ஆரம்பம்
kicking the ball	පන්දුවට පාදයෙන් පහර දීම	பந்தை தலையாலடித்தல்
knockout tournament	පැරදි පිළිමලුන් පිටු දැකීමේ ක්‍රමය/ඉවත ලෑමේ ක්‍රමය	விலகல் முறை நிரற் போட்டி
land mark	මග සලකුණ	பயணப் பாதை அடையாளங்கள்
landing	පතිත වීම	நிலம்படல்
late childhood	පසු ළමාවිය	பந்தை உதைத்தல்
league tournament	සාකල්‍ය ක්‍රමය	சுழற்சி முறை நிரற் போட்டி
lever	ලීවරය	ஈரல்
line of gravity	ගුරුත්ව රේඛාව	புவியீர்ப்புக் கோடு
load	භාරය	சுமை
middle age	මැදි විය	நடுத்தர வயது
momentum	ගම්‍යතාව	உந்தம்
mountaineering	කඳු තරණය	மலையேறுதல்
neonatal period	නවජ අවධිය	சிசுப்பருவம்
off side	නිසි නොවන ස්ථානය	உரித்தற்ற இடம்
old age	වැඩිහිටි විය	முதுமை
opposing player	පිළිමල් ක්‍රීඩකාව	எதிரணியினர்
penalty area	දඬුවම් ප්‍රදේශය	தண்டப் பிரதேசம்
penalty kick	දඬුවම් පහර	தண்ட உதை
penalty pass	දඬුවම් යැවුම	தண்ட எறிகை
penalty shot	දඬුවම් විදුම	தண்ட எய்கை
physical fitness	ශාරීරික යෝග්‍යතාව	உடற்றகைமைகள்
power	ජවය	வலு
power position	ජව ඉරියව්ව	வலு நிலை
prenatal period	පූර්ව ප්‍රසව අවධිය	முற்பிரசவப் பருவம்
processed food	පිරියම් කරන ලද ආහාර	பதப்படுத்தப்பட்ட உணவு
projectile	ප්‍රක්ෂිප්තය	உந்து விசை
projection	ප්‍රක්ෂේපණය	கை விடுகை
public health inspector (PHI)	මහජන සෞඛ්‍ය පරීක්ෂක	பொதுச் சுகாதார பரிசோதகர்
quality of life	ජීවිතයේ ගුණාත්මකභාවය	வாழ்க்கைத் தரம்
reaction speed	ප්‍රතික්‍රියා වේගය	மறுதாக்க வேகம்
receptor	ප්‍රතිග්‍රාහකය	தூண்டி

recovery (follow through)	පශ්චාත් ඉරියව්ව	உடன்தொடர் நிலை
reflex	ප්‍රතීක ක්‍රියාව	தெறிவினை
reflex arc	ප්‍රතීක චාපය	தெரிவில்
road map	මාර්ග සිතියම	வீதி வரைபு
road sign	මාර්ග සංඥාව	வீதிச் சமிஞ்சை
running exersice	ධාවන අභ්‍යාස	ஓட்டப்பயிற்சி
running track	ධාවන පථය	ஓடு பாதை
school sanitation survey	පාසල් සනීපාරක්ෂක සමීක්ෂණය	பாடசாலை சுகாதாரப் பரிசோதனை
self awarenss	ආත්මාවබෝධය	சுய விழிப்புணர்பு
service	පිරිනැමීම	பணித்தல்
sexual harrassment	ලිංගික අපචාරය	பாலியல் துஷ்பிரயோகம்
slow twitch fibres (STF)	සෙමෙන් ක්‍රියා කරන තන්තු	மெதுவாக இயங்கும் தசை நார்
standing start	හිටි ඇරඹුම	நின்ற நிலைப் புறப்பாடு
starting block	ආරම්භක පුවරුව	தொடக்கக் கட்டை
step	පියවර	மிதித்தல்
supporting base	ආධාරක පතුල	தாங்கும் பாதம்
take off	නික්මීම	மிதித்தெழல்
toss up	දෙදෙනෙකු අතර පන්දුව උඩ දැමීම	மேலெறிகை
tournament	තරගාවලිය	போட்டி
toxin	ධූලක	கழிவுகள்
trajectory	පරාවක්‍රය	பரவளைவு
trow-in	තුළට විසි කිරීම	உள் எறிகை
velocity of release	මුදාහැරීමේ වේගය	மிதித்தெழும் வேகம்
velocity of take-off	නික්මීමේ වේගය	மிதித்தெழும் வேகம்
youth	තරුණ විය	வாலிபப் பருவம்

Lesson Sequence

Lesson in text book	Competency level	No. of Periods
1st term		
1. Let us build a healthy society	1.1	6
2. Let us identify stages after childhood	2.1	5
3. Let us identify principles of biomechanics to maintain correct postures	3.1	3
4. Let us play volleyball	4.1	4
5. Let us play netball	4.2	4
6. Let us play football	4.3	4
2nd term		
7. Let us manipulate equipment adapting correct postures	3.2	2
8. Let us engage in outdoor activities	4.4	2
9. Let us learn about running events in athletics	5.1, 5.2, 5.3	8
10. Let us cooperate in management and organizing through sports	6.1, 6.2	6
11. Let us consume nutritious food for a healthy life	7.1, 7.2	10
3rd term		
12. Let us learn about jumping and throwing events in athletics	5.4, 5.5	4
13. Let us understand the musculoskeletal system	8.1	8
14. Let us maintain fitness related to motor skills	9.1	2
15. Let us maintain good interpersonal relationships	9.2	5
16. Let us identify the challenges in adolescence	10.1	4
17. Let us prevent sexually transmitted diseases	10.2	4